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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.

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The Registered Office and Laboratories of the B.C.I.R.A. are at:—
24, ST. PAUL'S SQUARE, BIRMINGHAM.
Telephone: Central 1895. Telegrams: CIRA.
The B.C.I.R.A. Scottish Laboratories are:—
Foundry Technical Institute, Meek's Road, Falkirk *(Telephone 332).*

Forthcoming Events.

MAY 1-2.

Iron and Steel Institute:—Annual meeting at the Institute of Civil Engineers, London.

MAY 2.

Institution of Mechanical Engineers:—Informal meeting in London. Discussion on "Empire Free Trade and the Engineer," introduced by Major A. W. Farrer.

MAY 7.

Institute of Metals:—Annual May lecture in London by Major F. A. Freeth, F.R.S., on "The Influence of Technique on Research."

MAY 8.

Chemical Society:—Faraday Lecture on "Chemistry and the Quantum Theory," by Prof. Dr. Niels Bohr (For. Mem. R.S.).

MAY 8.

Institution of Locomotive Engineers:—General meeting at Denison House, London.

The Middlesbrough Convention.

There is every reason to believe that the forthcoming 27th annual convention of the Institute of British Foundrymen, to be held at Middlesbrough from June 17 to June 20, will be in every way as interesting and educational as any of its predecessors. The Cleveland district is the largest and most important metallurgical centre in Great Britain, and as such is both a manufacturer and consumer of all types of castings.

An effort has been made to arrange a programme of Papers of special interest to the heavy industries. Stress has been given to the manufacture of steel castings, and a number of notable authorities are contributing from their experience. A Paper of international importance, dealing with the pig-iron resources of Great Britain, has been prepared by Messrs. Ridsdale. This will place in the hands of foundrymen a collection of data which will enable them to choose their raw material with the knowledge that everything available has been listed.

Works visits are to be a special feature of the programme, and members are already indebted to the local works for the ready and willing acquiescence to throw open their doors to the visitors.

The social side of the convention week includes a round of receptions, dinners, dances, excursions and a garden party at Overdene, Saltburn-by-Sea, by kind invitation of Mr. and Mrs. William Shaw. Mr. Shaw has just been elected President of the local section.

The President-elect, Mr. F. P. Wilson, is to be congratulated on the programme and progress so far made, and in this connection he has had sterling assistance from the honorary secretary, Mr. F. A. Harper, and Mr. N. D. Ridsdale, the local retiring President. There is only one factor needed to make the Middlesbrough convention an outstanding success and that is a really representative gathering of foundrymen. The social contacts made on these occasions are of the utmost importance, as they open up to the individual avenues of information otherwise closed.

A Lesson from Abroad.

Figures are now to hand from which it is possible to sum up the financial and industrial situation in Germany during the year 1929. Such a summary would at any time be of general interest to the practical man in Great Britain, since Germany is, industrially speaking, very much a power to be reckoned with. But in the present instance there is a particular interest as well. The year covered is the year of the foundry exhibition in Düsseldorf; the year in which a number of our readers visited Germany and saw for themselves something of that country's industry, returning to tell their friends about it and so spread the interest in an ever-widening circle. For this reason we deem it desirable to refer briefly to some at least of the figures in question. From a comparative point of view the year is considered to have been a bad one, and the unemployment figures, 2,100,000 during the early part of the year and 1,960,000 at the end of the year, certainly do not agree with the commonly-expressed view of a universally prosperous Germany. It is stated that home trade is bad, with falling prices and money too cheap to augur well for the immediate future. Many of the finishing manufacturing processes appear to have done badly. On the other hand, export trade of all kinds has flourished, and the crops were above the average. There is also the development of a number of new or comparatively new processes to offset the stagnation in some of the old ones. In short, if the year's production be taken as a whole it must certainly be considered good, but if it be studied in detail it shows many "bad patches." Notably the textile trades have been declining for a couple of years, and pottery has been in very low water. On the other hand, the coal output for 1929 exceeds that of the boom year 1927, being 163,470,000 as compared with 153,595,000 metric tons, and, what is even more significant, it exceeds the 1913 figure for production in the same area, which was 140,753,000 tons. Potash and synthetic nitre have increased similarly. Pig-iron reached the high figure of 13,401,000 tons, the earlier figures being 13,103,000 tons in 1927, and 10,916,000 pre-war in the comparable area. Ingot steel production shows a figure of 16,245,921 tons, which is almost the same as the 1927 figure, and which affords a striking comparison with the pre-war figures, which were 11,918,000 for the same area and 17,361,000 for the whole area at that period.

Here lies the point. In respect of steel the smaller Germany is producing very nearly as much as the larger Germany produced 17 years ago, and the figures for pig-iron are approaching a similar comparison. This is due primarily to the extensive technical improvements and reorganisations that have taken place in Germany, and secondarily to increased productivity on the part of the workers. We have had occasion previously to point out many of the lessons to be learnt from abroad, and we do not propose to repeat them on this occasion. But money talks, as the saying goes, and figures talk no less well. Those who are sceptical of the benefits of modernisation and technical development in industry would do well to study such figures as these and learn their lesson, remembering that they come from a country where taxation is high and where there is a heavy and constant burden of international indebtedness.

XUM

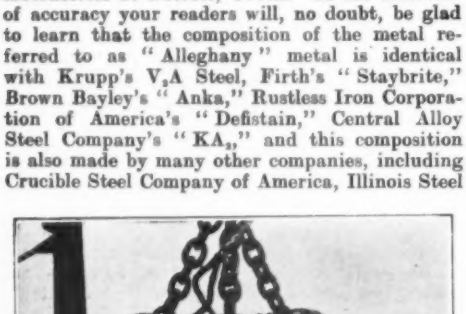
Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Stainless Iron.

To the Editor of The Foundry Trade Journal.

Sir,—We observe in your issue of March 27 a very mysterious description of the stainless iron stated to have been produced in the Ford laboratories at Detroit, U.S.A. In the interests of accuracy your readers will, no doubt, be glad to learn that the composition of the metal referred to as "Alleghany" metal is identical with Krupp's V$_2$A Steel, Firth's "Staybrite," Brown Bayley's "Anka," Rustless Iron Corporation of America's "Defistain," Central Alloy Steel Company's "KA$_2$" and this composition is also made by many other companies, including Crucible Steel Company of America, Illinois Steel Company, Carpenter Steel Company and by the Avesta Jernverks Aktiebolag, of Sweden.



An Interesting Application of a Straight Chrome Steel as an Electro-Magnet by the Rustless Iron Corporation of America.

Having knowledge of the above, your readers will not be misled, and they may be even tempted to inquire how much truth there is in the inference that this type of metal is being used exclusively in any one make of car.

The company with whom the writer is associated actually participates in the supply of a considerable, and perhaps the major, portion of this type of metal for one specific application on a well-known and popular automobile, but in addition they supply a straight chromium rustless iron almost exclusively for the other polished parts of this same car and for many higher-priced productions.

The accompanying photograph partly illustrates this claim.—Yours, etc.,

Ronald Wild.

Holmesfield, Pinehurst,
Baltimore, Maryland.

Welfare Supervision.

To the Editor of The Foundry Trade Journal.

Sir,—I have read with interest your article on welfare supervision, for it deals with the old antagonism between voluntary effort and bureaucratic method.

Some time ago Lord Invernairn, the chairman of the Industrial Welfare Society, wrote to the late Home Secretary, pointing out that voluntary enterprise was doing much to reduce the toll of accidents in history, and that the Society, by supplying posters, pooling for the benefit of its members the experience of firms in dealing with accident prevention, was playing a useful part in such work. Sir William Joynson-Hicks' reply was as follows:—

"For ten years the Industrial Welfare Society has been doing magnificent work in this and similar fields, and you have emphasised on every possible occasion the value of voluntary effort as against legislative enactment, but, in spite of the existence of something like 250,000 factories and workshops, you have only managed to secure 800 as members of that organisation. I find it a little difficult to reconcile this disappointing response with the criticism to which I have referred."

Employers have the remedy in their own hands. Either they support their own voluntary movements or, in default, lose the opportunity for ever.

One other matter—the compulsory appointment of a safety officer is likely to grit the wheels of industry, but in cases where a member of the staff, who has secured the confidence of the managers, foremen and workers, has been set apart for this "safety" work, experience has proved that his office readily justifies itself.—Yours, etc.,

Robert R. Hyde,
Director.

Industrial Welfare Society (Incorporated),
51, Palace Street, Westminster, S.W.1.

French Foundry Technical Association Elects Officers.

The following gentlemen have been elected officers of the French Foundry Technical Association for the year April, 1930, to April, 1931:—

President: Mr. André Damour, Maître de Forges, à Bayard (Hte-Marne), Président du Conseil d'Administration des Fonderies de Bayard & St-Dizier.

Senior Vice-President: Mr. Jules Cury, Fondeur à Deville (Ardennes).

French Junior Vice-Presidents: Mr. E. Dady, Président de l'Association Amicale & Mutuelle de Fonderie, à Paris; Mr. J. Derdinger, Président d'Honneur de la Chambre Syndicale des Fondeurs en Cuivre & Bronze; Mr. H. Magdelenat, Administrateur-Délégué de la Sté des Usines de Rosières, à Bourges (Cher); Mr. Ch. Masson, Administrateur-Délégué de la Sté "Mécanique Moderne," à Nancy (M. & M.); Mr. L. Montupet, Administrateur-Délégué des Fonderies Montupet, à Paris; Mr. E. Ronceray, Directeur de l'Ecole Supérieure de Fonderie, à Thiais (Seine); and Mr. H. Sandre, Administrateur Délégué de la Sté Métallurgique du Périgord, à Paris.

Foreign Vice-Presidents: Messrs. L. Brasseur (Luxemburg), J. M. Espana (Spain), J. Leonard (Belgium) and C. Vanzetti (Italy).

General Secretary: Mr. Ch. Koehler, Administrateur-Diréctеur de la Sté des Fonderies de St-Ouen, à St-Ouen (Seine).

Treasurer: Mr. A. Lardin, Gérant des Etablissements Lardin & Cie, à Paris.

Cement for Fastening Wooden Core Prints to Iron Patterns.—Mix together, and dissolve in boiling water, 2½ lbs. of glue to 2½ ozs. of gum ammoniacum. Stir with a rod whilst boiling, and at the same time add approximately 2 ozs. of sulphuric acid (H_2SO_4) in about eight small portions. Cool off slightly before using. The above recipe is useful when as old casting is used as a pattern, to which must be added core prints, etc. In cases where only one new casting is required, to secure the wood to the iron pattern with pegs and screws would be far more costly, and would take longer than the above method.

Random Shots.

It is curious how the most seemingly irrelevant things sometimes turn out to concern us quite closely. Who, for instance, would venture to suggest that the renovation of St. Paul's Cathedral could be of more than passing interest to the ironfounder as ironfounder, whatever it might be to him as a lover of fine architecture or as a citizen of London? But it was stated the other day that the stability of the cathedral is threatened or likely to be threatened by building operations that will divert the springs at present moistening the sand on which it is built. In other words, the future of St. Paul's is bound up with the fact that a clay-bearing sand attains its greatest strength when it contains a certain amount of moisture. And that, after all, is a subject well within our province!

* * *

I believe I have been in the habit of referring to conferences and conventions as hardy annuals, but, inspired to accuracy in matters horticultural by the opening of the lawn-mowing and pea-planting season, I can't help feeling that it would be nearer the truth to call them perennials. I have devoted no thought at all to the subject for months, yet here I am faced with a whole series of summer and autumn meetings. There is the American Foundrymen's Association Convention in Cleveland during May—at which I fear I shall not be present. There is our own I.B.F. meeting at Middlesbrough in June, and the impressive-sounding Pan-European Foundry Congress in Liége not long after. And in September there will be all the autumn meetings—notably the Institute of Metals, which stays in England this year, and the Iron and Steel Institute, which is going to Prague. That, I admit, tempts me, for Prague in particular and Czecho-Slovakia in general is said to be an amazing mixture of the old and the new, the artistic and the practical, and the country has a high reputation for hospitality. . . .

* * *

However, from the point of view of the secretaries and other gentlemen whose shoulders bear the burden of organising these affairs, I daresay each convention is very much of an annual, and not necessarily a hardy one at that, involving careful preparation of the ground, sowing and watering, weeding, hoeing and staking, if the crop is to be up to standard. It all depends on the point of view!

* * *

Some More Dewarisms.

When a bachelor flatters himself he knows anything about women, he flatters himself.

Life is made up of trials—with an occasional conviction.

We have been told that man is the noblest work of God, but nobody ever said so except man.

If cheerfulness counts, the bride's father is generally the best man at a wedding.

Success is merely a matter of buying your experience cheap and selling it at a profit.

All women like bargains, but they will never have it suggested that they are wearing one.

If you don't advertise you fossilise.

Marksman.

The Lesser Iron- and Steel-Producing Countries in Europe.

II.—POLAND, ITALY, SWEDEN AND SPAIN.

Poland.

As a result of the Peace Treaties Poland gained control of the major portion of the iron and steel industry of Upper Silesia. In 1913 the total output in Upper Silesia amounted to 995,000 tons of pig-iron and 1,400,000 tons of steel. In that year Eastern Upper Silesia—which was ceded to Poland under the Peace Treaties—accounted for some 630,000 tons, or practically two-thirds, of the total pig-iron production of Silesia, and for some 1,050,000 tons, or approximately three-quarters, of the total steel output.

As was shown in Table I in the previous article (see last issue), Poland in 1929 attained an output of 710,000 tons of pig-iron and 1,450,000 tons of steel, compared with the corresponding figures of 670,000 tons and 1,410,000 tons in 1928. The iron and steel industry in Poland is highly organised as regards sales and distribution. At the end of 1925 a national syndicate was formed for the whole of the iron and steel industry, with the exception of tubes—for which there is a separate selling organisation—the Syndicate controls the sales of all iron and steel products both on the home and export markets. It should be mentioned that the bulk of the output of the metallurgical industry in Poland is destined for home consumption. In 1927 the industry registered an extraordinary increase in output—the figures being practically double those of the previous year—due in the main to the increasing home demand. It is claimed that the national Syndicate has carried out important functions in eliminating wasteful competition and stabilising prices on a remunerative basis.

In addition to being highly organised on the distributive side Poland also provides an outstanding example of the trend towards concentration of production. The localisation of the major portion of the iron and steel industry in Eastern Upper Silesia has been a potent factor favouring this development. Eastern Upper Silesia is responsible for practically the whole of the coke, some 75 per cent. of the coal, and some 70 per cent. of the iron and steel output of the country. The most important amalgamation which has taken place recently was that which was formed last year between the three concerns, the Katowicka, Huta Silesia and the Bismarckhütte Companies, the resultant combine having a capital of £2,300,000. It is interesting to note that the Harriman concern of New York has taken up a substantial shareholding in this new merger, which has also entered into a working agreement with the Königs and Laurahütte; Harrimans are also understood to have obtained a controlling interest in this latter concern, and it is believed in many quarters that sooner or later a complete amalgamation will take place by the formation of a holding company. Such a combine would control approximately 50 per cent. of the total coal, iron and steel production of Poland and would therefore occupy a dominating position in the heavy industries in general in that country. The important part being played in this particular line of development by American financial interests is worthy of attention.

Although included as a member of the International Tube Syndicate since the end of 1927, Poland has not yet joined the Continental Steel Cartel. Negotiations have taken place on numerous occasions between the members of the Cartel and representatives of the Polish iron and steel industry, but up to the present time they have invariably broken down owing to the difficulty of reconciling Poland's claims with the terms offered by the present members. Poland maintains that she must have a free hand as regards her domestic market, as, in view of the potentialities of industrial development in the country in general, steel consumption in Poland is likely to increase considerably during the next few years and the Polish steel industry must be free to satisfy this increased demand without incurring penalties. It was rumoured that Polish delegates had attended the last series of meetings and that some agreement was likely, but these rumours have been definitely denied.

Although Poland has not yet joined the Continental Steel Cartel, representatives of the Polish steel industry have concluded an agreement with the German steel manufacturers whereby the latter agree to export to Poland only those rolled products which are not manufactured in Poland; in return, Poland undertakes not to export rolled products other than tubes to certain countries which are of particular interest to German manufacturers. In addition Poland has agreements regarding the reciprocal protection of domestic markets with the national steel industries of Austria, Hungary and Czecho-Slovakia.

Italy.

Substantial progress has been registered by the iron and steel industry in Italy during recent years in spite of the fact that it is on an artificial basis in the sense that supplies of the essential raw materials within the country itself are very scanty. Ore supplies are small, the chief sources being the Isle of Elba and the Aosta Valley in the Southern Alps; and practically the whole of the coal used has to be imported from abroad. The steel industry in Italy developed considerably during the war, and after passing through many difficulties in the immediate post-war period, has gradually increased its output in recent years. Production in 1929 totalled 580,000 tons of pig-iron and 2,200,000 tons of crude steel. The Italian Government, for reasons of national policy, is strongly in favour of the development of a vigorous iron and steel industry in the country and, by erecting a high tariff wall, has secured that the industry shall have a protected home market which absorbs the major proportion of the output. In view of the high costs consequent on the importation of essential raw materials, increasing attention has been paid to the question of efficiency both as regards production and distribution. The proposal has been put forward in some quarters that a comprehensive organisation should be formed, under the supervision of the State, which would reduce costs by closing down uneconomic plants and allocating orders among the more efficient concerns in such a way that they should be executed by the works most favourably situated.

Certain progress has already been made in the direction of co-operation. Last year a central organisation—the Consorzio Siderurgico Italiano—was established for the purpose of studying the different aspects of rationalisation as affecting the iron and steel industries in general. And in addition a central selling agency—the Unione Siderurgico Italiano—was formed which controls the sale of the majority of the rolled products of the affiliated companies.

Rumours regarding Italy's entry into the Continental Steel Cartel have again been revived recently, but there is reason to believe that the present members of the Cartel are not overanxious that Italy should join; they fear that her membership would unduly complicate the organisation of the Cartel without any commensurate benefit, as the importance of the Italian iron and steel industry on export markets is negligible.

Sweden.

The iron and steel industry in Sweden is of considerable antiquity, pig-iron having been produced as early as the twelfth century. In the eighteenth century Sweden was the leading iron-producing country in the world and, though she has long since lost that position as regards tonnage, she has continued to pay increasing attention to the manufacture of quality products. The basis of the iron and steel industry in Sweden is the presence of extensive and valuable ore deposits. It was estimated that at the end of 1928 240,000,000 tons of ore had been produced by the Swedish mines, of which approximately half had been smelted by Swedish ironworks. For the production of iron in Sweden the most important ores are those in central Sweden.

In 1929 Sweden attained an output of 480,000 tons of pig-iron and 670,000 tons of steel. The industry, however, is seriously handicapped by the lack of coal supplies within the country; most of the coal used has to be imported, with a consequent increase in producing costs. As a result of the shortage of coal and of the wealth of timber supplies, smelting by charcoal has persisted longer in Sweden than in other countries. Considerable attention has also been paid to the utilisation of water-power for the generation of electricity, which is steadily becoming more important to the iron and steel industry. Last year three electric furnaces were started by the three Swedish works—the Sandviken, Hofors and Wikmanshyttan concerns. Technical experts have also devoted considerable time to the investigation of the general problem of fuel economy in iron and steel manufacture, and it is reported that as a result certain improvements have been introduced. In addition concerns such as the Hellefors, Kohlswa and Hofors works have been engaged on extensive development programmes for the modernisation and extension of plant.

It would appear, however, that for a considerable period to come the Swedish iron and steel industry must continue to be hampered by a shortage of fuel supplies and the high costs involved in their importation. It is significant that during the post-war period, pig-iron output has not yet reached the 1913 level, contrary to the experience of most of the other minor producing countries, has made little progress during recent years. Steel output is somewhat better, but it was only last year that it surpassed the 1913 figure.

Spain.

Spain, like Sweden, is rich in ore supplies, but, unlike Sweden, has developed her coal production considerably compared with the pre-war period; whereas the output of coal in 1913 was some 4,000,000 tons, in 1928 it exceeded 6,000,000 tons. The increase has been made possible to a large extent by the growing industrialisation of the country and by the preferential treatment accorded to the coal industry by the Government in the way of loans, exceptional freight charges, etc. Much of the coal, however, is of poor quality and unfavourably situated from the geographical point of view, with the result that considerable quantities are imported.

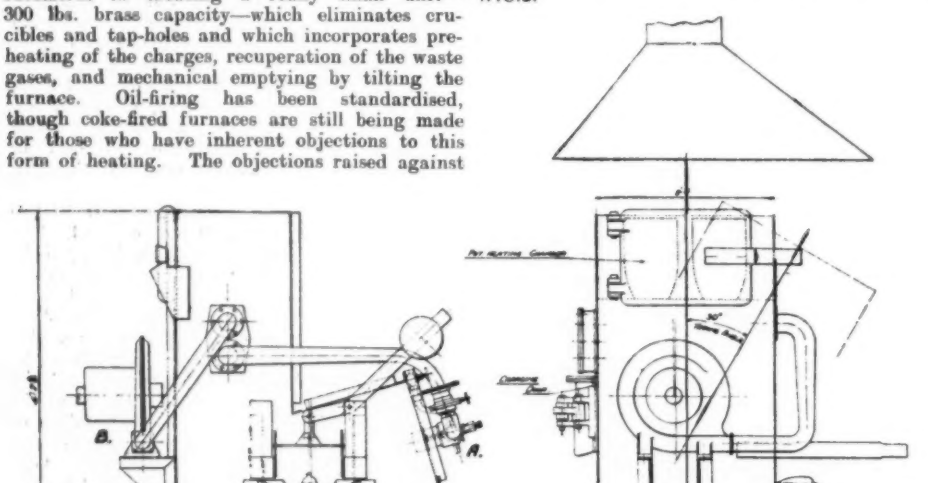
Before the war, Spain was essentially an agricultural country, and the iron and steel industry was of minor importance. It developed during the war in consequence of the withdrawal of competition by the important European steel-producing countries, and, in the post-war period, its development has been fostered still further by Government assistance of various kinds, and, in particular, by the erection of a high tariff wall against foreign iron and steel goods. The production of pig-iron and steel totalled 610,000 tons and 800,000 tons respectively in 1929.

(*Continued on page 322.*)

XUM

Sklenar Midget Furnace.

From their inception, improvements in the design and performance of the plant made by the British Reverberatory Furnaces, Limited, have been recorded in these pages. However, we consider their most recent production—the Sklenar Midget furnace—to be a real advance on the earlier models, as the designers have been successful in creating a really small unit—300 lbs. brass capacity—which eliminates crucibles and tap-holes and which incorporates preheating of the charges, recuperation of the waste gases, and mechanical emptying by tilting the furnace. Oil-firing has been standardised, though coke-fired furnaces are still being made for those who have inherent objections to this form of heating. The objections raised against oil-firing, namely, dirty fumes on lighting-up and variations in oil prices, are now virtually non-existent, as improvements in burner design has eliminated the former and industrial evolution has veered in the direction of the production of large quantities of suitable fuel-oil as a by-product in quantities well in advance of current consumption.



The Sklenar Midget Furnace.

The Sklenar furnace can best be evaluated by summarising its complete performance during five days. During this period between 17 and 21 casts were made daily, the average time between charging and tapping varying from 25.5 to 30 min. The average oil consumption in lbs. per 100 lbs. of metal melted (these were various copper alloys) varied between 5.2 and 6.1.

In one day's melting 16 charges of 300 lbs. of copper-zinc alloy were made, and the results are set out in Table I:—

Heat No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Time in mins. ..	65	37	27	31	27	30	23	20	28	28	26	30	30	23	28	30
Oil consumption in galls. ..	5½	3	2½	2½	3	2½	2½	2	2½	2½	2½	2½	2½	2½	2½	2¼

The furnace was lit up at 8.20 a.m. and the last charge was withdrawn at 6.10 p.m. We understand that at the present price of fuel-oil this works out at 5s. 7d. per ton of metal melted and ready for casting. Those who visited the recent British Industries Fair were in a position to judge the temperature reached, and we personally are satisfied that for the majority of non-ferrous alloys an ample margin is given. Every brick which goes to form part of the fabric is numbered, and this factor, associated with the easy removal of the back plate, allows the lining to be repaired with a minimum of delay. In the design there has been an intelligent appreciation of both inspection and hearth cleaning. A Radiol Industrial Oil-burner has been adopted as standard, and this is used in conjunction with a recuperative system.

The offices of the exploiting company, Messrs. British Reverberatory Furnaces, Limited, have recently been changed to 88, Kingsway, London, W.C.2.

The Lesser Iron- and Steel-Producing Countries in Europe.

(*Continued from page* 321.)

The most important iron and steel concern is the Sociedad Anonima Altos Hornos, which possesses nine blast furnaces and which is responsible for 50 per cent. of the total iron and steel output of the country. Another important firm is the Sociedad Siderurgica del Mediterraneo (in the south of Spain), which has two blast furnaces and is understood to be contemplating the erection of two more.

In conclusion, it may be stated that a consideration of the position in the less important steel-producing countries suggests—not that the supremacy of the older steel-producing countries is likely to be threatened, although, as has already been pointed out, the aggregate production of the smaller countries is by no means inconsiderable, but that competition in international steel markets is likely to become even more intense as developments in the national steel industries of countries in Eastern, Central and Southern Europe inevitably restrict the opportunities of the older steel-producing countries to do business in these markets.

A Paint to Withstand Severe Weather.—A good paint for ironwork, exposed to all kinds of weather, may be made as follows:—Turpentine, 1 part; boiled linseed oil, 1 part; Dr. Angus Smith's solution, 1 part; and red oxide of iron (ground in oil), 2 parts. To the above 2 ozs. of any good dryer should be added for every 2 lbs. mixed. The resulting solution is also excellent for painting ironwork in moulding-shops, as it is capable of withstanding the effects of heat and sulphur gases for some considerable time.

Recent Clyde Launches.

Messrs. William Beardmore & Company, Limited, Dalmuir, have launched a cruising motor-yacht, "Romany Rye," for Sir Gervasse Beckett, Bart.

The Burntisland Shipbuilding Company, Limited, have launched a cargo steamer, "Havso," which has been built for Mr. Peter Dedekam, Ascendal, Norway. The vessel is specially designed for Baltic and timber-carrying trades. Triple-expansion reciprocating engines obtaining steam from two large cylindrical boilers at 180 lbs. pressure are being supplied by Messrs. MacColl & Pollock, Limited, Sunderland.

Messrs. Lithgows, Limited, of Port Glasgow, have launched the motor tanker, "Athel-templar," which they have built for the United Molasses Company, Limited, London. The vessel is of the two-deck type constructed on the longitudinal system of framing for the carriage of oil and molasses in bulk. Messrs. John G. Kincaid & Company, Limited, will supply two sets of single-acting Burmeister & Wain engines to develop over 4,100 h.p.

Messrs. Harland & Wolff, Limited, launched the twin-screw motor cargo-vessel, "Silver-walnut," for Messrs. Stanley & John Thompson, Limited, London. The vessel is 455 ft. long, 61 ft. 9 in. broad and 40 ft. in depth, and the propelling machinery will consist of two sets of single-acting Diesel engines of the Harland B and W type.

Messrs. Robert Duncan & Company, Limited, Port Glasgow, have launched the twin-screw Diesel motor-ship, "Storanger," built for Messrs. Westfal, Larsen & Company, Bergen, for the carriage of oil in bulk. She is about 13,000 tons deadweight and constructed to the highest class special survey of Norske Veritas and Norske Skibskontrol. Diesel propelling and steam-driven auxiliaries on the Burmeister & Wain-Harland & W. system will be supplied by Messrs. John G. Kincaid & Company, Limited, Greenock.

Standard Tin-Base White Metal "B."

The fourth of the series of non-ferrous standard analysed samples is now ready for issue. The analysis is as follows:—

Tin	84.0
Antimony	7.52
Copper	4.03
Lead	3.86
Zinc	0.40
Iron	0.05
Arsenic	0.04

For many years non-ferrous chemists have wished to have a standard of this kind to guide them in the analysis of tin-base bearing metals on account of working to specifications, confirming the quantity of the high-priced metals in the alloy and settling disputes. The analyses have been made by 12 chemists experienced in testing this class of alloy. The list includes a Government Department, also several referee chemists, manufacturers and users. An important feature of the certificate of analyses is the outline of the methods used by the different chemists.

The standard is available to anyone at a price based on ultimately covering the cost of preparing and issuing it. The three usual sizes, viz., 50-grm., 100-grm. and 500-grm. bottles, are provided, together with certificate and methods with each sample. Further particulars may be obtained from British Chemical Standards Headquarters of 3, Wilson Street, Middlesbrough.

Grease for Core Bogie Axles.—Mix together tallow, 6 lb.; palm oil, 1 gallon; mineral oil, 1 gallon; plumbago, 1 lb.; and soda, ¼ lb. The mixture is melted gradually and should be stored in a cool, moist atmosphere when not required for immediate use.

Steel Castings.*

Mr. J. Currie said that from the practical steel-founder's point of view the author had presented little that could be criticised, as he had confined himself mainly to well-known facts which the founder knew that he had to face. He thought that the Paper would have been a suitable one to have presented at the symposium last year when the Admiralty representatives were present. He asked whether Mr. Service could recommend any method by which the founder could overcome fluid contraction, and had he any experience of the different methods of moulding—green sand or dry sand—to overcome the solid contraction? There had been illustrated a thermocouple placed in the mould, he had the idea that it was impossible to obtain a thermocouple that would stand up to the temperature of molten steel running into the mould. Had Mr. Service any experience of any couple that would stand up to these conditions? If so, he would be glad to have some information about it.

Mr. Service, in reply, said that Mr. Currie had raised the question of fluid contraction and methods for overcoming it. He had tried one or two methods, such as cooling by nails and using internal chills. The latter he found more satisfactory than nails, but he would like to utter the warning that they must recognise that when putting a steel bar into molten steel they had to make sure that it was free from oxide. He advocated tinning the bar, as it was then possible to secure welding between the steel and the bar. Regarding the determination of temperatures, in the experiments described the metal was cast at a comparatively low temperature, the metal being melted in crucibles, and, as Mr. Currie had remarked, the temperatures recorded were undoubtedly low, but it was possible to obtain a Berlin porcelain sheath that would resist these temperatures. In everyday practice the only pyrometer that he had found at all satisfactory was an optical instrument.

Running Wheel Castings.

Mr. Harry Baird said that Mr. Service had shown on the screen a wheel, 10 ft. in dia. run from both sides of the rim. He would like to know where the risers were placed? He would also like to ask if Mr. Service had tried running such wheels from the centre?

Mr. Service replied that the risers were placed round the circumference and in the centre. He had not tried running them from the centre, but he thought that perhaps running from the centre might give more satisfactory results, as side runners take a long time to fill the mould, and perhaps the quicker running from the centre might lead to better results. At any rate, he thought it worth trying.

Mr. Tennant said that reference had been made to the deoxidation of steel by aluminium, but he believed that the use of this element had become out of date. Mr. Service did not state definitely how his steel was produced in the furnace. Judging from the analysis which had been given, it appeared that ferro-manganese had been used as a deoxidiser. It seemed to him that it would be much easier to run castings of the composition indicated than it would be with steel containing one to two-tenths per cent. of carbon. He had had occasion recently to work with a very pure metal, which depended upon a very high temperature for its fluidity, and he had experienced some difficulty in obtaining sound castings. The castings were something like those shown in Fig. 21, having light and heavy sections, and where cracking took place, he would like some information about the types of sand—dry sand or green sand—which eliminated shrinkage best. He thought that the gas question was not nearly so difficult to deal with as the contribution cavities. Mr. Service had shown how chilling produced cavities, and had stated that he considered them due to the oxide film, but might they not be also caused by the presence of a paste unable to resist the pull?

Deoxidation Questions.

Mr. Service replied that Mr. Tennant had raised several very important points. The steel with which he was dealing was made in the acid open-hearth furnace and was deoxidised with manganese and silicon. The question had been asked as to which should be used first. Dr. McCance had shown that manganese was equally as good a deoxidiser as silicon. The manganese oxide was more fluid, so the manganese was added first, as the oxide is then eliminated in the slag. It had been found that the steel did not contain so many inclusions if the silicon was used after the manganese. The analyses of slag shown were made on the scum which formed after the mould was filled, and the percentage of manganese shown was 35. If the steel was not properly deoxidised the percentage was very much lower. In regard to the relative merits of green-sand and dry-sand moulds, he personally had had no experience with green sand, but from what he had observed on the Continent and from experimental work, dry sand seems to lead to more tearing than green sand. He thought that those founders who dealt with small sections were fortunate, as green-sand moulds could be used and knocked out as soon as they were cast.

Critically Bad Compositions.

Mr. Shanks said that he was in the habit of working with a rather different type of steel from that described by the lecturer. He did, however, experience much the same difficulties with tears and draws. He was interested in the different types of sand used and would be glad to know if Mr. Service could suggest any further steps that could be taken in dried moulds to reduce the tearing. Did Mr. Service add the ferro-manganese to the original charge or during working the bath?

Mr. Service replied that what Mr. Shanks had said was true about steel containing 0.1 to 0.2 per cent. of carbon and also that the higher carbon material had a greater strength. He thought that if the carbon was low, the manganese should be not less than 1 per cent.

Mr. Brown said that he once saw in a foundry a pulley 6 ft. in dia. cast in steel and it had not a tear in it, but a similar pulley only 2 ft. 6 in. in dia. was torn all through the rim. Could Mr. Service explain the difference in the contraction of the two castings? The author had stated that the use of aluminium as a deoxidiser was out of date, but he did not think that that was correct. He believed that aluminium was thirty times better than silicon for the purpose. Aluminium had the advantage that it did not go into the steel, and he would like to know why Mr. Service thought that the use of it was out of date.

Use of Aluminium Explained.

Mr. Service, in reply, said that Mr. Brown seemed to be under the impression that he had inferred that aluminium was now out of date as a deoxidiser. He had, however, no such ideas and as a matter of fact he used aluminium in his foundry rather extensively. He added as much as 16 ozs. to the ton, and that was common practice in Sheffield and on the Continent. He agreed with Mr. Brown that it had the advantage of not going into the steel. There was, however, the danger, if the steel were of comparatively low temperature, of alumina being included in the metal, and it was, therefore, very necessary to be careful that the steel was at a high temperature when the aluminium was added. At high temperatures the action of aluminium and silicon was the same. He had found that high-manganese metal was stronger than low-manganese material and better able to resist tearing. He would like to ask a question: he had found the worst steel to make into castings or plates was that containing 0.2 to 0.23 per cent. carbon and 0.5 to 0.6 per cent. manganese. It tore more than any other steel. He would like to have suggestions for the reason of this; he had found it necessary to use over 1 per cent. manganese.

The question had been asked, how can one overcome the contraction in dry-sand moulds? He had recently had some cases of very complicated castings which gave a good deal of trouble. He filled up with ashes, and after the mould had been cast a minute or two he relieved by knocking out the ashes, but it was not possible to do that in all cases.

Dangerous Ranges.

Mr. Shanks said that he was able to recognise a very dangerous range of composition in the steel Mr. Service had mentioned. He had found that tearing was generally worse under these figures. He also had found that with steel containing 0.1 per cent. carbon and 0.5 per cent. manganese they had worse results than with 0.12 per cent. carbon and 0.5 to 0.7 per cent. manganese.

Mr. Stewart said that he would like to ask whether it was not better to deoxidise in the bath rather than the ladle. His experience had been that better results were obtained by using ferro-manganese in the bath, especially in the case of low-carbon steel.

Mr. Service, in reply, insisted that all good practice demanded deoxidation in the bath. His experience was that if the carbon in the steel was low, high manganese was necessary.

Collapsible Cores.

Mr. A. Campion said he had little criticism of the Paper to offer, as Mr. Service had pretty well confined himself to certain facts which were well known to steel founders and which had to be circumvented by the skill of the moulder. There was just one aspect of tearing which had not been referred to by Mr. Service, and that was the matter of cores. It was his experience that a very large proportion of tears were caused by the unyielding nature of mould and cores. It was the unfortunate circumstance that steel was in its very weakest state at about the solidification stage, and therefore mould and core must be sufficiently yielding to allow of the metal passing the weak range without undue strain. He would like to hear Mr. Service's views as to core-making.

Mr. Service, in reply, said that he agreed with what Mr. Campion said about cores. He generally found that the moulder was inclined to put in very strong core irons. He had seen them so strong that no man could break them. All that was needed was just sufficient strength to hold the core together until the metal set.

Ironfounding Methods Applied to Steel.

Mr. Laurie said that, although he was not a steel founder, he had listened with much interest to the lecture and one or two thoughts came to him. In regard to the wheel which gave trouble one speaker had asked, why not run from the centre? He would not advise running from the centre, as he thought that what was required was to balance contraction, and to do that he would run from the rim. His argument in favour of that method was that the hot metal was put where the casting cools first. He also suggested that the wheel could be successfully cast with an open head to double the height of the casting—that is to say, run it like a ring and then cut off the ring. He did not know how the trouble of segregation would be met by that method, but the idea of Mr. Service did not eliminate the segregation—it

(Continued on page 324.)

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* Discussion upon the Paper read by Mr. T. M. Service before the Scottish Branch of the Institute of British Foundrymen, and published in the Foundry Trade Journal, April 10 and 17, 1930.

Erection of New Buildings and Interference.

SOME LEGAL ASPECTS EXAMINED.

By a Barrister-at-Law.

The Quantitative Value of Light.

In view of modern conditions, especially those resulting from the remarkable growth of our urban population, it is only to be expected that questions relating to light and air arise in our Courts. Occasions occur where the protection of ancient lights are imperative, whether they are connected with business or private premises, for an infringement might have the effect of greatly reducing the value of a particular property. In order, therefore, to avoid expense and possible litigation, when new buildings are being contemplated, the question as to whether or not their erection would interfere with easements enjoyed by adjoining premises should be well considered beforehand. Moreover, there is sometimes another point to be considered, on the other hand, and that is whether or not it is intended to abandon any ancient lights attached to any building which it is proposed to pull down. Some remarks will be presently made on this point, but when any actual doubt exists upon any of these matters the precaution should be taken to obtain professional guidance and advice. A distinguished judge not so long ago pointed out, in a case in which he was delivering judgment, that in recent years great advances have been made in the study of light problems and that certain conclusions have been arrived at from which it was possible to ascertain the quantitative value of the light in a room under varying conditions of obstruction. While this is, of course, very true, and while a more definite system of scientific proof by means of geometrical charts or projections is now sometimes available, the difference and conflict of opinion often arising in the past will undoubtedly continue to be associated with many aspects of these questions in the future. It is hardly necessary to add that the appropriate remedy when an infringement is proved may be found by means of an injunction to restrain, or damages by way of compensation, or, in necessary cases, by a Mandatory Injunction.

A Leading Case.

In a well-known leading case, the plaintiff asked for an Injunction to restrain his opposite neighbour from putting up a building so as to obstruct his ancient lights. It was then laid down that even if the plaintiff would still have plenty of light for his business premises this did not matter; because the owner of ancient lights is entitled not only to sufficient light for the purpose of his then business, but to all the light which he had enjoyed previously as to the interruption sought to be restrained. In the words of a former Lord Chancellor, "the right conferred or recognised by the Statute is an absolute indefeasible right to the enjoyment of the light, without reference to the purpose for which it has been used." The third section of the Prescription Act provides that when the access and use of light to and for any dwelling-house, workshop or other building shall have been actually enjoyed therewith for the full period of 20 years without interruption, the right thereto shall be deemed absolute and indefeasible, unless the same was enjoyed merely by written consent. This section, it may be stated, has been held not to bind the Crown. An indefeasible right, however, to the access and use of light may be gained by prescription at Common Law, independently of the Act.

Some General Aspects.

Within the limits of a short article it is only possible to refer to a few of the general aspects of the question. The right to ancient lights is abandoned by pulling down the building, or blocking up the lights, with the intention of abandoning; but the question of intention is, of course, always one of fact, depending in each case upon the actual circumstances. If a person opens new lights, or enlarges old ones, these new lights, or enlargements, may be obstructed with impunity, but the original lights are still entitled to protection. A right to unobstructed light cannot be acquired in favour of open ground, but only in favour of buildings. The building, however, need not be occupied or even completed internally so as to be fit for immediate occupation. There is no standard of the light ordinarily required by a house for the purposes of habitation or business. If there is an obstruction of the light of a house which causes substantial diminution of the light, such as to cause substantial damage to the owner or tenant, that is an interference which entitles the persons injured to relief, although after the obstruction the house may be no worse lighted than the majority of the houses in the neighbourhood, or may have what is, in the opinion of the judge, abundant light for all ordinary purposes of inhabitancy or business. It should be mentioned, perhaps, that there is no rule of law that a person may always build up to an angle of 45 degrees. But in judging of the probable effect of a proposed building the Court may not unreasonably regard the fact that an angle of 45 degrees will be left as *prima facie* evidence that there will be no substantial interference, and may require this presumption to be clearly rebutted by satisfactory evidence.

A Principle Applied.

The law has been laid down that where a person grants a house to which there are windows, neither he nor anyone claiming under him can stop up the windows or destroy the lights. This is based on the principle that a man may not derogate from his own grant. It is equally settled law that if a man has a house and land and grants the land first, reserving the house, the purchaser of the land can block up the windows of the house. But if the owner of the land and the house sells the house and the land at the same moment, and expressly sells the house with the lights, then the purchaser of the land is not entitled to block up the lights, the vendor being the same in both cases, and each purchaser being aware of the simultaneous conveyances.

Distinction as to the Right to Air.

The question of the right to air is quite distinct from that relating to the right to light. A legal remedy will be available, of course, where there has been a diminution or alteration in the quantity or quality of air so considerable as to cause a nuisance, or be prejudicial to health. But it has been held, for example, that the access of air to chimneys cannot, as against the occupier of neighbouring land, be claimed, either as a natural right of property, or as an easement by prescription from the time of legal memory, or by a lost grant, or under the Prescription Act. In one particular case the defendant built on his own land and so intercepted the current of air which blew laterally from the defendant's premises past the plaintiff's premises, which were more than 20 years old, thereby causing the air in the plaintiff's yard to become more stagnant. Here the court held that the plaintiffs were not entitled to an injunction to compel the defendant to pull down his building. In another case, however, where the facts will be readily distinguished, the cellar of the plaintiff's public-house was ventilated by means of a shaft cut therefrom through the rock into a disused well in an adjoining yard, owned and occupied by the defendant; the air from the cellar passing through the shaft and out at the top of the well. The cellar had been so ventilated for 40 years at least, without interruption, and with the knowledge of the occupier of the yard. In this case the learned judge held that the plaintiffs could legally claim, as against the defendant, the easement of the free passage of air from the cellar and that a lost grant of the right ought to be inferred.

Provisions of the Law of Property Act, 1925.

The Law of Property Act, 1925, provides that nothing in Part I of that Act shall affect the operation of any statute or of the general law for the limitation of actions on proceedings relating to land or with reference to the acquisition of easements or rights over or interest of land. Under the same Act it is provided that where an easement, right or privilege for a legal estate is created, it shall enure for the benefit of the land to which it is intended to be annexed. To this it may be added that the same statute further enacts that nothing contained therein shall affect the right of a person to acquire hold or exercise an easement right or privilege over or in relation to land for a legal estate in common with any other person, or the power of creating or conveying such an easement right or privilege.

Steel Castings.

(*Continued from page* 323.)

only hid it. Regarding collapsible cores, it was necessary, whether in green sand or dry sand, that they collapse in front of the compo. He wondered whether oil-sand cores were used in the steel foundry; he would suggest making a face with an oil bond and put behind that the rottenest sand available and use another bond inside, just sufficiently strong to hold the metal.

Mr. Service, in reply, said that running the wheel from the inside was worth consideration, although he had never done it. He would think about it. Mr. Laurie asked, why not get all the segregation to the outside? As a matter of fact they did that, but other troubles arose. He agreed with Mr. Laurie that the method he referred to did not eliminate segregation, but only masked it. A steel casting was generally a compromise. Regarding the use of oil bonds for the core sand, he had used it with considerable success for small cores, but he was doubtful if it would be successful in the case of large cores. The largest core that he had made in oil sand so far was three inches.

Dr. Donaldson, in proposing a vote of thanks to the author for his Paper, said that he had enjoyed the manner in which Mr. Service had put before them certain fundamental facts in connection with the production of steel castings. These permitted of little discussion, but he was particularly interested in the account of the German experimental work, and he wondered if this had any connection with the very cheap prices which Continental firms quoted for castings.

Brass for Vertical Shaft Bearings or Footstep.—An excellent mixing for such bearings is 4 parts of copper to 1 part of tin. No lead or zinc whatever should be introduced. Although this mixing may seem unusual, the results are far superior to the ordinary.

Hardening Cast Iron.—Clean the casting to be treated very thoroughly, taking care to remove all sand on the surface. Then heat the casting to a bright red colour and immediately submerse in a solution of 6 gallons of water, 1¼ pints oil of vitriol, and 4 ozs. of saltpetre, or in similar proportions. The heating of the casting should be effected as uniformly as is possible if the best possible results are to be obtained. The above process may be repeated three or four times, according to the degree of hardness required.

The Foundry is a Machine.*

By G. E. France.

The present generation lives in stirring times, in industry no less than in the wider fields of life's endeavour. The rate of progression seems to become faster as time goes on, and it behoves individuals occasionally to detach themselves, as it were, critically to examine themselves and their activities in relation to the whole. As individuals, or as industrial concerns, one is very much in the position of a participant in a race who, no matter how content he may feel with his own particular position, finds it advantageous occasionally to survey the field of other competitors and to accommodate his own further endeavours to the newer altered conditions which he observes. So it is generally. In order to obtain and maintain success in the race of industry it is essential that one should periodically survey existing conditions and modify methods, or equipment, to suit, and inasmuch as conditions are constantly altering, these surveys, and the necessary action they demand, should be thorough and frequent.

It is, of course, true that whilst the prevailing tendency of the age has been, and is, to displace human motion, as far as ever possible, by mechanical motion, that tendency is only just permeating the foundry. Thirty or forty years ago mechanical means were replacing human labour in many branches of industry. Prior to and during the war there were rapid developments in the machinery of engineering shops, but it is only during the last decade that any *general* attempt has been made to adopt the principle in the foundry. No matter how much one may try to ignore the fact, this is definitely the "machine age," the principle of which is simply the one just postulated—"the replacement of human motion by mechanical motion to the farthest possible degree." This principle is, of course, the subject of much bitter controversy which rages around the multitude of aspects from which the effect of the principle in operation is viewed. Thinkers, writers and publicists of all descriptions are busy the world over expressing their reactions to this new and rapidly-extending force in the philosophy of civilisation. It actively affects everybody in almost every phase of each individual life. Every industry, every business, indeed every branch of human endeavour is affected. It is idle to ignore this new force, and thus emulate the awe-inspiring example of the ostrich. The machine would still exist and roll on ponderously. One must, to use the words of the Prince of Wales, "adopt and adapt."

Economic Consideration.

It has been said with infinite truth that "necessity is the mother of invention," and dire economic necessity was the mother of the machine age and all that it implies in its multitudinous ramifications. It is sheer economic necessity which maintains it; and its future development, to its ultimate logical conclusion, will be due to the merciless insistence of that economic necessity. The economics of industry are fundamentally simple. In its simplest form industry is the conversion of some material from one form into a higher form of greater value. This conversion, accomplished by the application of labour and brains and opportunity, costs money. The cost of the raw materials plus the gross cost of conversion represents the price of the converted material. The price at which the converted material is sold on the market is fixed by a competitive market, and more or less, by conditions beyond the control of the converter. The cost price of his raw materials is also fixed very largely outside his control. Profit accruing from industry therefore is the difference between the cost of the converted material and its selling price. Broadly speaking, therefore, the only control the manufacturer really has is his cost of conversion and, as his margin between raw material cost and the selling price of his converted goods is, within narrow limits, fixed, it follows that the amount of the cost of conversion very largely determines the extent of the manufacturer's profit. Despite "high falutin'" opinions to the contrary, the continued existence of any industry is entirely dependent upon that industry providing a profit on its work, and, as the livelihood of even the humblest worker is dependent upon the existence of the industry, it is definitely to the interest of everyone concerned in an industry to cut down the cost of conversion or production.

The above exposition ignores many important points of both economics and business, but it is fundamentally true and does in a very general way illustrate the real facts. If industry is to maintain its position and to forge ahead attention must be focussed on the "cost of production" and every available means utilised towards a reduction of this item.

Cutting Material Transport Costs.

What is true of industry generally is equally true of the foundry. Here the cost of production must be cut down so that a margin of profit can be maintained and the volume of trade increased. The costs of production are, of course, many and varied, and can be classified and sub-divided according to the ingenuity of the cost accountant, or the policies of the management. It has been said "that castings were made from metal and labour—mainly labour," a statement which was true of all foundries until recently, and still only too true of the average foundry to-day. From actual analyses which have been made it has been found that in order to make and dispatch one pound of castings it was necessary to pick up and to lay down the equivalent of one pound anywhere from 160 to 260 times. When one remembers the large quantities of auxiliary material, such as sand, boxes, bottom plates, cores, core plates, etc., which enter into every day production, in addition to the metal itself, this immense handling becomes obvious. A large number of these handlings are, of course, necessary and unavoidable, but a study of all the operations involved offers convincing evidence that the number, and thus the cost, of these handlings can be greatly reduced by a little re-organisation and by the introduction of modern plant. Not only could labour be saved but time, and also floor space.

Ideal Conditions.

Consider for a moment the ideal conditions. A foundry where the floor is clear, where the atmosphere is as good indoor as out, where dust, heat and grime are reduced to a minimum, where hard manual labour is unknown; where, in short, the conditions of labour are conducive to health and decent living, where the guess work is eliminated from the technique of founding by the control of skill and certainty, where, by reason of all these improved conditions the product is improved in quality and the cost of production is reduced with a corresponding increase in output. This is the ideal and may remain only an ideal for some time, but that fact should by no means prevent one from striving to attain that ideal if only founders, individually, progress a short distance on the road. It is realised that only in comparatively rare instances it is possible, by reason of restricted conditions which are often beyond the foundryman's control, to go even a fair way along this desirable road, but, on the other hand, almost every foundry can discover instances where the general principle may be further applied with a corresponding advantage in economic operation. The conditions which the British founder has to meet, and under which he has to produce castings, are the conditions which prevail here in Britain, not in America, or

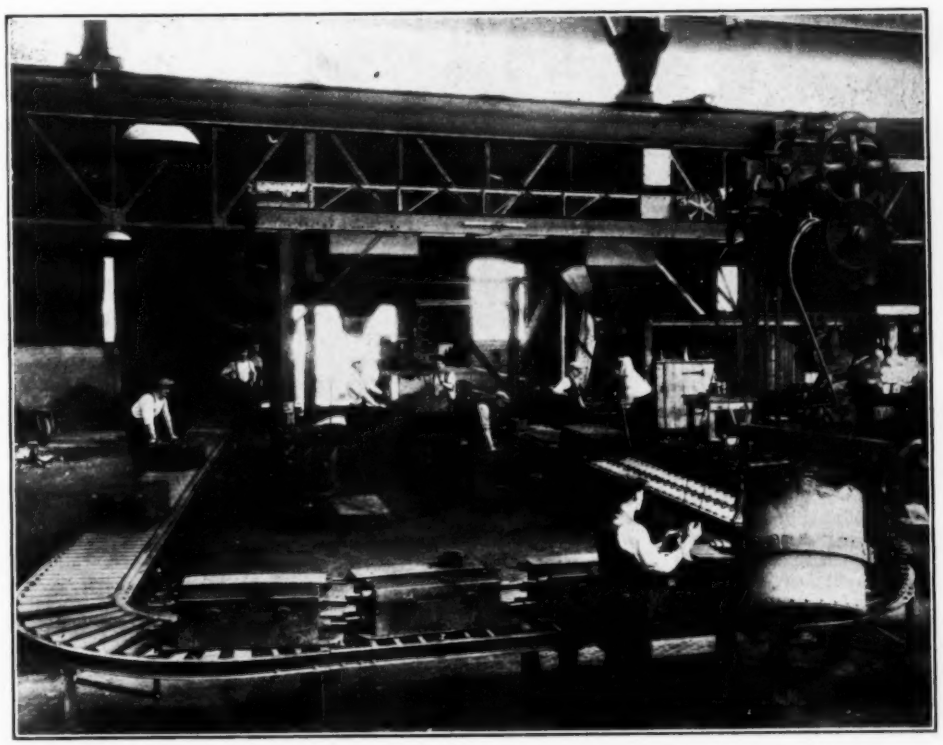

Fig. 1.—A Continuous-Casting Plant making One Casting only, Utilising Two Machines, Jib Cranes and a Roller Conveyor.

* A Paper read before the Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen.

Belgium, France or Germany, and whilst, of course, one must carefully investigate and watch the foundry development abroad, it is as well to remember that it does not necessarily follow that methods and plants found successful in other countries would repeat that success if applied in Britain. This is true, of course, not only of countries but even of districts in a country or even of individual foundries. It cannot be over-emphasised that the methods and plants should be designed in relation to the actual local conditions obtaining where the application is to be made.

It is undeniably true, for example, that remarkable production figures are obtainable where continuous casting systems have been adopted to the manufacture of, say, car wheels in certain American foundries, but that, in itself, is no valid reason for the adoption of a continuous casting system, in its entirety, for their manufacture in this country, unless the conditions which guarantee the success of that particular method in America are prevalent here.

It is idle to say that car wheels must be standardised to ensure an output sufficient to justify the system, because that is a condition of production over which the foundryman has, as yet, no control. That condition should be impressed upon the buyers of car wheels; but, at the same time, neither is the fact that British conditions differ from the Americans, a valid reason for *not* incorporating as much improvement in method and plant as is economically suited to the conditions here. It may not be economical to install a continuous-casting system, but it may pay to improve the method of moulding or to install a central sand-handling plant, for example.

It may quite conceivably be, and very often is, that quite a large percentage of the economy which would accrue from a continuous-casting system may be obtained by the accumulated economies resulting from the re-organisation and improvement of the existing methods, together with the modernisation of plant.

Experience with the design and installation of modern foundry plant has served to convince the author that there are few general laws upon which designs of foundry handling plant can be built. There are definite guiding principles which determine the form of this part or that, but the successful design and construction of an efficient plant is very largely a matter of experience. A specialisation in understanding the multitude of varying conditions which exist in all types of foundries, and the design of that plant which a wide experience of all sorts of conditions indicates as being the best to suit the particular set of conditions prevailing in that particular foundry.

In the foundry, the machine age probably reaches its maximum development, so far as it is known, in the continuous-casting system, the complete ideal of which aims at the maximum conservation of the costs of production, the provision of the best working conditions, and the production of the best possible casting by the fullest utilisation of mechanical motion.

Fig. 2.—A Further View of the Plant shown in Fig. 1, detailing the Sand-Distributing Arrangements.

Basic Principles.

The essence of the system in operation, of course, is a definite continuity of successive operations at the highest possible speed, an aim to which all other ends must be subservient—continuous supply of metal and boxes, of sand, of cores, and moulds. In its simplest form, the continuous casting system consists of a number of definite stations at which certain operations are performed, or necessary equipment or

Fig. 3.—The Knock-out Section and Sand-Preparing Unit for the Plant shown in Fig. 1.

Fig. 4.—A Close-up View of the Sand-Preparing Plant for the System shown in Fig. 1.

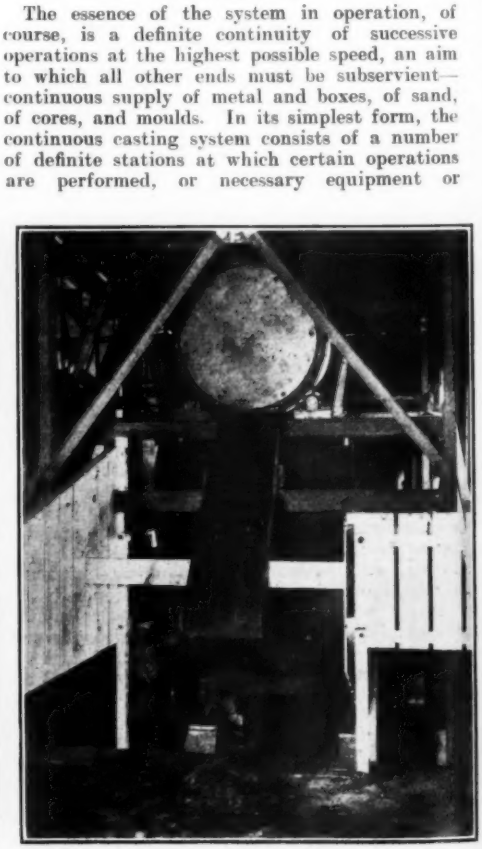

Fig. 5.—The Reverse Side of the Plant shown in Fig. 4.

articles supplied; and the connection together of these stations by means of conveyors along which the raw materials and auxiliaries move, through various stages of manufacture, to the ultimate completion of the casting. Obviously, a large number of varying types of continuous-casting system are possible, but all subscribe to the same common basic principles. Fundamentally, therefore, continuous casting is an attempt to reduce to a minimum the variable factors involved in founding and their replacement by constants, an end which is obviously attainable only by the standardisation of the necessary definite cycle of operation, and its continuous repetition, without variation. All the necessary equipment must be designed for the end in view. Box parts should be interchangeable, and in order to accomplish this it is often necessary to use machined faces with pin holes drilled in jigs. Patterns and core boxes must be true and durable, for retaining their trueness to ensure correct impressions, and to avoid or to minimise trimming of the cores or moulds. The sand used in the moulding machine must be consistent and uniform, it must be cool, free of all foreign matter, perfectly mixed, blended and tempered; of the proper bond and aerated. Melting conditions must be arranged so that a continuous supply of correct metal at the correct heat is definitely guaranteed at the pouring point. There are three great advantages obtained by the continuous-casting system—primarily, a better product; and, secondly, a cheaper product.

Advantages Shown.

A better casting is obtained because most of the factors which, through their occasional variation, have caused poor or waster castings, are standardised. Extraneous influences are removed. A cheaper product is obtained, of course, because the cost of production is reduced in so many directions:—(1) The handling is reduced to a minimum. (2) All actual productive plant or labour is working at a greater rate, thus increasing its efficiency and reducing its cost. For example, if a moulding machine on continuous-casting system with boxes and sand delivered to it can make three moulds in the time previously taken for two, then its efficiency is increased by 50 per cent. and the former cost of two moulds is now spread over three. (3) The total standing charges per casting are less because of the considerably greater output which is produced in less floor area. (4) Further floor area is available for other production; (5) Less labour is required, as all unskilled work is now accomplished mechanically. (6) Less equipment in the shape of boxes, weights, clamps, etc., is needed owing to their quick release and re-use. This reduction often represents a very considerable saving. (7) Less sand is required. (8) Owing to the sand-cleaning equipment, scrap and small iron is recovered and available for re-melting. (9) By the very virtue of the elimination of variable factors the percentage of wasters is reduced.

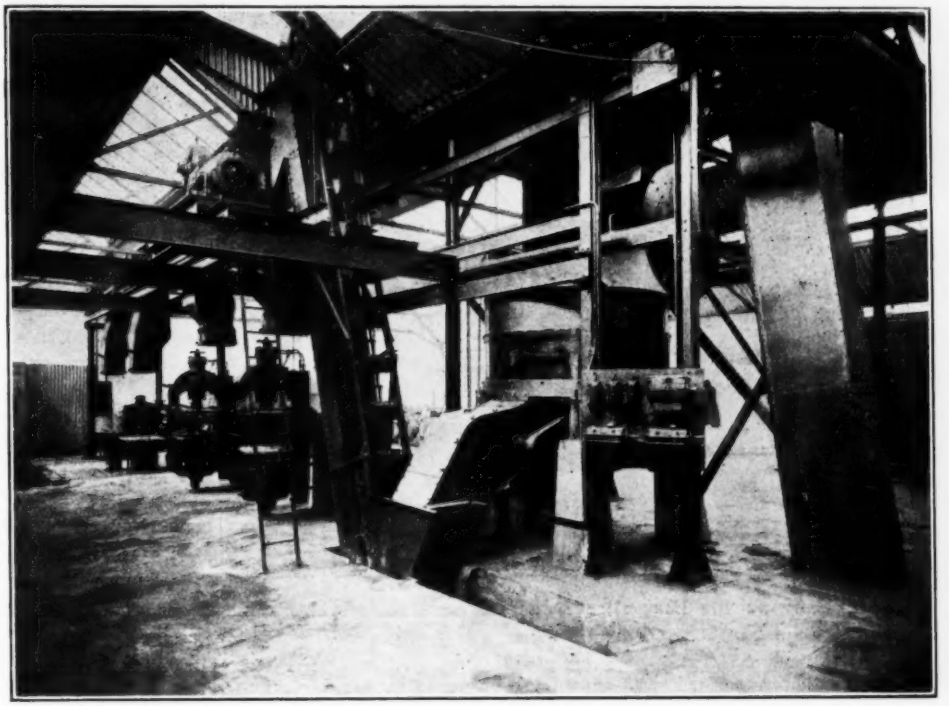

Fig. 6.—A Sand-Handling Plant for a Continuous-Casting Process.

The third great advantage of the continuous-casting system is that, although less labour is actually used, the labour which is employed can be paid higher wages and can be employed in far better working conditions.

Essentials for Success.

The adoption of the continuous-casting system, and thus the fuller appreciation of all that the machine age has to offer, is, of course, entirely dependent upon certain very definite conditions, amongst which are the following:—

(1) The demand for the particular casting, or castings of a similar type, size and weight, must be such as to ensure that the total economies in production costs are great enough to justify the initial capital cost and the necessary maintenance charges involved in the installation of the continuous-casting system; and (2) labour must be agreeable to operate the system, be appreciative of the working advantages gained and be enthusiastic of the possibilities in the system. In this connection it would be as well to say, delicate though the subject is, that evolution is a sure and inevitable law. The opposition of labour to the introduction of machinery has been a very real factor retarding the development of mechanical processes; and the disinclination to assist in the greater efficiency of the foundry has resulted in the alarmingly rapid increase in the supplanting of castings both by fabricated steelwork, which is lighter and cheaper now, and also by die castings and stampings.

A Typical One-Casting Plant.

In the continuous-casting system illustrated only one type of casting is produced. This particular casting, which weighs approximately 50 lbs., is made in a two-part box. Three castings being made in each box. The cycle of operations is clearly illustrated in Fig. 1. Here the bottom part is seen being produced on the left-hand moulding machine, the top part on the right-hand moulding machine. A jib crane enables the box parts to be lifted from the end of the short conveyor, which brings them to the machine, on to the machines themselves. The bottom part, after being made, is transferred, by means of the jib crane, on to the roller conveyor, being positioned here upon the bottom board. The top part is then brought forward and the mould closed, being propelled by a special propelling arrangement towards the pouring station. The moulds are poured upon the short level portion of the conveyor at the front of the illustration and, after pouring, proceed towards the knock-out down a slightly inclined length of conveyor. The knock-out is seen in the left background of Fig. 1. Fig. 2 shows a closer view of the rear portion of the system, illustrating quite clearly the knock-out, the short

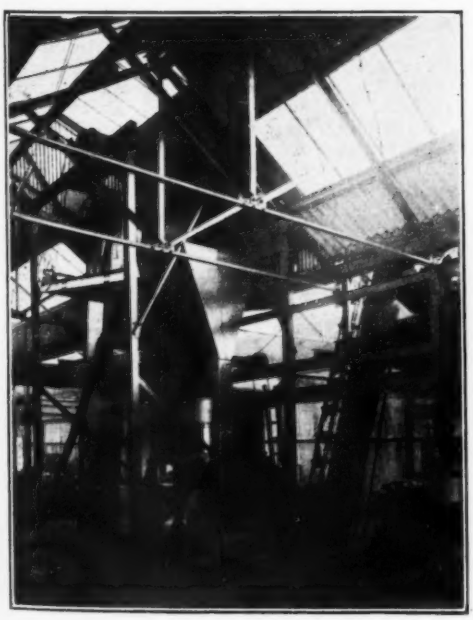

Fig. 7.—A Rear View of Fig. 6.

Fig. 8.—Sand-Preparing Plant.

length of conveyor which carries the empty boxes back to the machines, and the sand delivery arrangement. The elevator seen in the middle of Fig. 2 carries the mixed and reconditioned sand from the sand-preparing plant to a scraper-flight-conveyor, shown on the right, which discharges this prepared sand into the two hoppers, one above each of the two moulding machines. The sand from these hoppers is allowed to fall into the moulding box and the fall of sand is easily regulated by means of the valve at the bottom of the hopper. Fig. 3 shows a closer view of the knock-out and the sand-preparing unit. The sand removed at the knock-out is allowed to fall through the grid in the floor on to a jigger-feeder which delivers the sand into the buckets of the elevator seen in Fig. 3.

Fig. 4 gives a still closer view of the sand-preparing unit. Here the elevator, bringing the sand from the knock-out, is shown on the left, and it is seen that this elevator discharges the sand into a rotary screen. The sand passing through the screen is delivered into a rotary batch measurer, each compartment of the measurer holding approximately 9 cwts. of sand. The sand from the batch measurer is discharged then into the Simpson intensive sand mixer placed beneath the batch measurer. After being reconditioned in the Simpson mixer the sand is discharged through an August aerator, which is an integral part of the mixer, directly into the boot of the elevator shown on the right of Fig. 4, which is the elevator conveying the prepared sand to the moulding-machine hoppers. Fig. 5 shows the reverse side of the sand-preparing unit. Above is seen the tailing end of the screen, whilst beneath is the Simpson sand mixer. It will be seen that the tailings from the screen include quite a number of pieces of flashing and bits of iron.

Fig. 9.—Showing the Easy Discharge into the Heel of the Bucket Elevator.

Fig. 10.—A Simpson Mixer Incorporated in a Sand-Mixing Plant.

Fig. 11.—A Large Capacity Sand-Handling Plant.

It is believed by the designers of this particular plant that proper reconditioning of the sand can only be accomplished by batch preparation, and the batch measurer is a means of converting the Simpson mixer, which is a batch machine, into service in a continuous plant. It will be seen from the photograph illustrating this continuous-casting system that the whole system is quite self-contained, and whilst 600 castings are produced per 8-hr. shift only 10 tons approximately of sand are in use. This particular continuous-casting system is, of course, extremely simple; there are no complications such as would be obtained in larger installations, but it does prove an extremely interesting example of the principle upon which continuous-casting systems are based.

A Second Example.

Fig. 6 illustrates another example of the sand-handling portion of a continuous-casting system. As this particular illustration was made before the complete continuous-casting system was installed no mould conveyors are shown.

The knock-out grid, in this particular installation, is immediately at the foot of the elevator shown on the right. This elevator conveys the sand, discharging it into a rotary screen as in the previous case. The sand from the rotary screen falls through, via the batch measurer, into the Simpson mixer and then into the boot of the bucket elevator through the August aerator, shown in the middle of the photograph, which in turn delivers the sand into a scraper flight conveyor feeding the hoppers over the four moulding machines, shown on the left of the view. Fig. 7 is a view of the same unit from the opposite side. The knock-out is seen on the left of the photograph in this case. The tailing shoot from the rotary screen is clearly seen. This particular sand-preparing unit has a capacity of approximately 9 tons of sand per hour. There are, of course, many other variations of the continuous-casting system than the one taken as an illustration. The principle applied has been illustrated in its simplest form and other examples are only variations to a greater degree dependent upon local conditions. There are many other types of equipment which are embodied in continuous-casting systems than that shown, due to the particular demand of the particular case. There are schools of thought whose interest is concentrated on this type of elevator or conveyor or that, but the student would soon discover that few generalisations could be made and successfully defended, and he would ultimately realise that each type or means of handling had its own advantages and disadvantages, rendering it pre-eminently the type for certain conditions and not for others.

Sand Handling as a Nucleus.

The field is so vast that it is not reasonably possible for the author to do more than illustrate the principle in operation rather than to dilate upon a multitude of variations in design and construction which continuous-casting systems may take. Although it has been shown that certain definite conditions determine whether the fullest utilisation of the machine age, as exemplified by the continuous-casting system, can economically be adopted by certain foundries and whether the complete advantages of such a system can be gained, yet almost every foundry, even if a continuous-casting system cannot be justified, can discover some advantages to be gained by the adoption of some mechanical equipment. The continuous-casting system may not suit all outputs, but a central sand-handling plant, for example, may, in itself, increase production and reduce production costs.

Fig. 8 shows a sand-preparing unit which is not working in conjunction with a continuous-casting system, but which is, nevertheless, treating sand for issue to a large number of moulders. The knock-out is not shown in this view, the elevator appearing on the left conveys the sand from the knock-out to the rotary screen, which in this particular case discharges its screened sand into the hopper shown. It will be noticed that the truck which brings the used sand and discharges it into the knock-out, travels a little farther along the track to receive the prepared,

(*Continued on page* 332.)

Foundry Training Abroad.

By J. G. Pearce, M.Sc., and M. H. Pearce, M.A.

V.—Belgium.

Industrial Conditions in Belgium.

There are two sets of conditions governing foundry training in Belgium. The country is highly industrialised in proportion to its area, containing, as a matter of fact, some 800 foundries—iron, malleable, steel and non-ferrous. Its workmen have always been of a high standard of intellectual training and capacity. The general educational standard is extremely good, and there is a plentiful supply of local technical instruction. From these factors it results that the workman is quick to pick up knowledge in everyday contact with his more experienced fellows, and also that there are a number of foremen and owners who have actually trained themselves to a very high level of competence with the help of the courses provided by the various local technical institutions. Furthermore, there used to be a number of systems of craft training in existence among the workers themselves, the best known example being that of the hand moulders of the Herstal district, who used virtually to train their own successors. In the second place, the effect of the war could not but be considerable where Belgian industry was concerned. It cut right across established methods and habits of industrial recruitment and training, and deflected so much labour that an entire reorganisation was required in many cases. The increased use of machinery and the altered conditions of employment in general subsequent to the war, including the introduction of the eight hours' day, coupled with the growing preference on the part of the young men for cleaner or supposedly more fashionable trades—a preference that is familiar to founders all over the world at the present time—caused further disorganisation.

It results from these factors that local and particular agencies have until recently supplied the needs of Belgian foundry training, and that everything, either in the nature of a co-ordinating movement or of central institutions, is of extremely recent growth and, for the most part, not yet come to fruition. A further result of the rather special conditions is to be found in the existence of a highly-developed correspondence course in foundry technique—a method of instruction that appears admirably suited to the abilities of the Belgian workman. It must also be noted that foundry training in Belgium is largely concentrated on moulding and moulding practice, probably on account of the historical connections of the craft in the country. Nevertheless, Belgian conditions are very well worth studying, because the country presents a number of similarities with Great Britain, considered from the industrial point of view—its small area, its dense population, its highly-industrialised character, its dependence upon a prosperous export trade, etc.

Training Courses for Moulders.

Would-be qualified moulders are trained by two main methods—either by certain specialised technical training institutions or by apprenticeship courses organised by prominent employers. Under the first head the most important example is the University of Charleroi (Université de Travail). It includes a day vocational school, candidates for which must be 13 years of age and must have had six years' attendance at an elementary school. The course lasts three years, the first year's studies being common to all sections of the school and comprising general educational courses, drawing lessons, and practical and technical foundry work. In the second year the students are graded according to capacity, the lower or Vocational grade being admissible at the end of the course to the evening continuation classes, the upper or Industrial grade proceeding if they so desire direct to the Higher Industrial School for four years' further study for a diploma. In addition a few specially capable students are prepared during their third year for a special Technical Engineering School. The theoretical courses cover French, mathematics, physics and chemistry, electricity and drawing, the scientific subjects being taught in so far as they are germane to the object of the course, namely, the training of competent foundry workers. The foundry technological courses cover the study of sands, casting, and defects in castings, while the practical work is based upon constant co-operation between the pattern-makers and the moulders and a close association between the drawing and the technological courses.

In addition to the day vocational school the University of Charleroi includes evening classes whose object is the completion of vocational training by apprentices and workers already engaged in the industry of the locality. This course also lasts three years, and students must be 14 years of age and must, in addition to their elementary education, have spent at least three months in the trade. The courses are based in general upon the same principles as the day courses already described.

The University of Charleroi runs its own small cupolas, one of 30 cwts. per hr. and the other of ½-ton per hr., the latter being specially designed for experimental and research purposes. Its plant also includes drying stoves, moulding machines, and an electric overhead crane. The Vocation School of the City of Verviers runs a similar but much shorter course for older and in general better-educated students.

Training by Apprenticeship.

The other important method of training is exemplified by the Foundry School organised by the Liége Pipe Company (Compagnie Générale des Conduites d'Eau). The school was founded in 1927, and it gives a three-year course. There is an eight-hour working day, two hours out of the eight being devoted to theoretical work, and the practical work may be moulding or pattern-making as preferred by the individual apprentice. The theoretical courses are based upon the need for training capable manual workers and not would-be scientists. The practical course has an unusual feature in that the apprentices are entirely segregated from the older workers for the first and second years of their course, the third year representing a kind of transition stage during which they are drafted gradually into the normal life of the works. Separate shops or bays for apprentices are, of course, commonly to be found, but the segregation in this case appears to be unusually complete. An agreement is signed and remuneration takes the form of a basic wage plus a bonus in proportion to the merit of the work done. This bonus sometimes amounts to as much as 30 per cent. of the basic rate. The practical teaching is in the hands of two instructors and the theoretical teaching is done by various competent members of the company's staff. In addition there is a school Principal to co-ordinate the work and to act very much as the old-time master craftsman must have acted towards the indentured apprentice of his day.

Similar efforts are to be found in various other Belgian works and foundries, including a number in the Ghent district. A slightly different example is that of the courses organised by the Malleable Foundry Owners' Federation of Herstal to meet the labour problems already referred to, intensified in their case by the completeness of the system that the war destroyed. A series of lectures was arranged during the past season for one evening a week, the subjects being as follow: History and evolution of malleable founding, study of sands, elements of moulding, hand moulding, special moulding, plaster casts, pattern plates, moulding machines, core-making, comparative study of melting methods, raw materials for malleable, core boxes and machines, pouring of metals, annealing, accidents and precautions, control of production, tests, wasters, upkeep and maintenance, shrinkage and blow-holes, blackheart, and scientific management in foundries. There was an average attendance of 36 at each lecture.

Training for Foundry Executives.

The training of the technical and executive grades is frankly admitted to be inadequate throughout the country. The Arts and Crafts School (École des Arts et Métiers) at Pierrard-lez-Virton is equipped with a foundry and pattern-shop, and students are trained for subsequent specialisation in foundry work. The training covers a long period in which the students become familiar with every branch of the trade, including core-making, sand preparation, moulding, cupola work, preparing the charge and cleaning the cupola, while graduate engineers give theoretical instruction in the mixing of cast iron, general organisation, casting, rate-fixing, costing, etc. There are also regular courses in metallurgy and laboratory work.

Finally there is the correspondence course organised by M. Ivan Lamoureux at the Foundry Institute (Institut de Fonderie) at Liége, which is designed to give instruction in the technical side of foundry work to those members of the technical and executive grades who are so situated in respect of time or locality that they are unable to attend the usual courses in these subjects. The course covers sands, the elements of moulding, the study of certain typical moulding propositions, sand moulding without a pattern, the drying of moulds and cores, and melting mixtures.

Conclusions.

The outstanding feature of foundry training in Belgium is what may be described as its adolescent condition at the present time. Of the examples quoted, nearly every one is either of recent foundation or it is to be supplemented in the immediate future by additional courses or by the establishment of an additional school. It has been suggested, for instance, that a foundry school somewhat on the lines of the Paris Foundry High School may be added to the University of Charleroi, which would appear to be the best-situated and the best-equipped institution for such a purpose. The Vocational School of Liége is organising its foundry section on new premises whose construction has been undertaken by the city authorities, and this should be ready next year. The works foundry school cited has not yet carried through the first of its three-year courses, which were only inaugurated in 1927. The Herstal lecture-courses for moulders appear as yet to have been purely experimental in character. Further, the efforts of the Belgian Foundry Technical Association are being directed towards the furtherance of vocational training and technical efficiency.

A study of Belgian conditions, therefore, is suggestive rather than informative, and its value to the British observer lies rather in the opportunity that Belgium affords for watching foundry education as it grows than in the example it offers of a completed working scheme.

Sir W. G. Armstrong, Whitworth & Company, Limited, have received an order from the Buenos Aires Western Railways for engines and tenders, at a cost of £43,000.

Building a Mould in Sections for a Machine Base.*

By J. Bennett.

It is proposed to describe the methods employed in the construction of the mould for a machine base, as there is a chance that a similar shape may be required in other productions, in the making of which, perhaps, the same principles may reasonably apply.

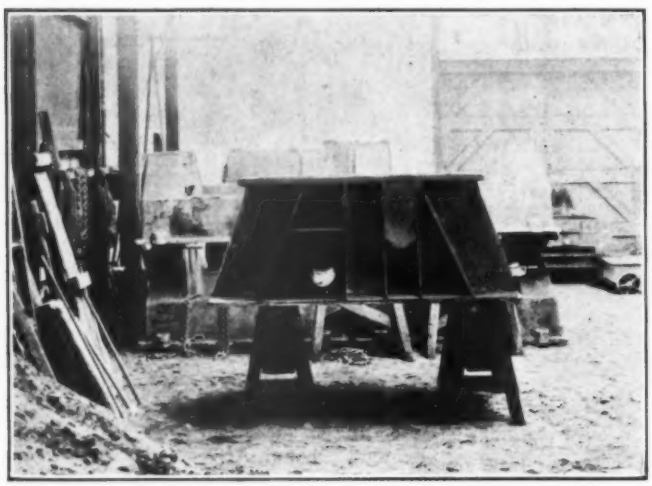

Fig. 1.—Front View of the Finished Casting.

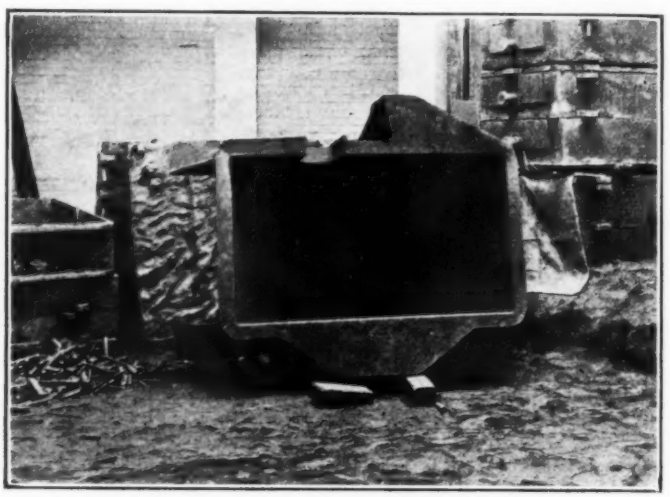

Fig. 2.—The Inside of the Machine Base.

At the time this kind of work came along, there was only a crane of 5-ton lifting capacity, which was considered inadequate to deal with the boxes had the job been made in the ordinary way. Three moulding boxes, top, middle and bottom, 6 ft. by 10 ft., and the middle box 2 ft. 7 in. deep, would have been required.

With these limitations to overcome, the question of alternatives had to be considered. It then occurred to the author that the task could be accomplished by dispensing with a complicated wooden pattern requiring many loose parts and substituting a series of sectional cores, and also discarding the iron moulding boxes with the exception of an existing top, or covering box. At the outset there was no doubt as to the practicability of the scheme, and the resultant castings were excellent, being free from scabs and blowholes. From the experience gained after making six such castings, the author would never make them in any other way.

The cores were easily made, dried, handled and assembled, and a further advantage was an estimated saving of two days on each casting.

Mould made from Cores.

Figs. 1 to 3 illustrate different views of the finished casting when in working position, looking inside from the top, and looking underneath, respectively. These give a fair idea of the shape of the job, the body of which was semi-circular with various ribs and a base on which to stand. A group of the core boxes used is shown in Fig. 4. There were nine of these, two of which were small ones, the latter being made to simplify finishing and blacking where there were rather deep supporting ribs or brackets. They were bolted one in each side core. Fig. 5 illustrates the grids for supporting the sectional cores. Nothing else was made specially for the job, and in consequence the costs in preparation were very low. Six castings have been made and the grids are as good as ever.

The two end cores shown in Fig. 6 were made from a frame core box and the circular parts strickled off; the runner can be seen in one of these. Fig. 7 shows one of the two side cores, which were not, however, both alike, as the box was altered to make an outlet on one side of the casting only. The grid was carried beyond the end of the cores, and bolt-holes were cast in these. On either end was a projection which fitted against the end cores and so determined the thickness of the side. Fig. 8 shows the two "lightening" cores for taking metal out of the back side of the casting. In Fig. 9 the main core is shown in position.

Assembling Details.

In the actual assembling the mould was built up in the floor of the foundry, where a pit about 4 ft. deep had been excavated. A grid with girders and eye-bolts was fixed in the bottom for the purpose of bolting down when the mould was finally closed. Two straight-edges or levelling strips were embedded at the bottom of the pit to strike a true sand bed, and upon this a print 1 in. thick was placed. The bed was then made up to the level of the print with facing sand, and after being trued-up the print was withdrawn. The main core was next placed in and rammed round to prevent any metal from getting into the vent. The air is taken into

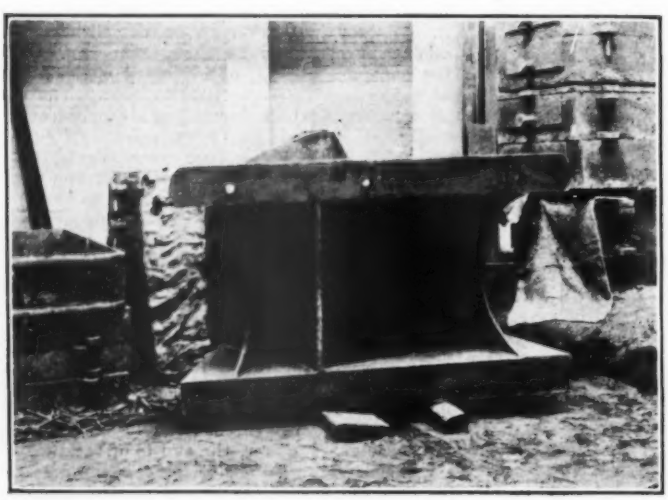

Fig. 3.—The Underneath Appearance of the Casting.

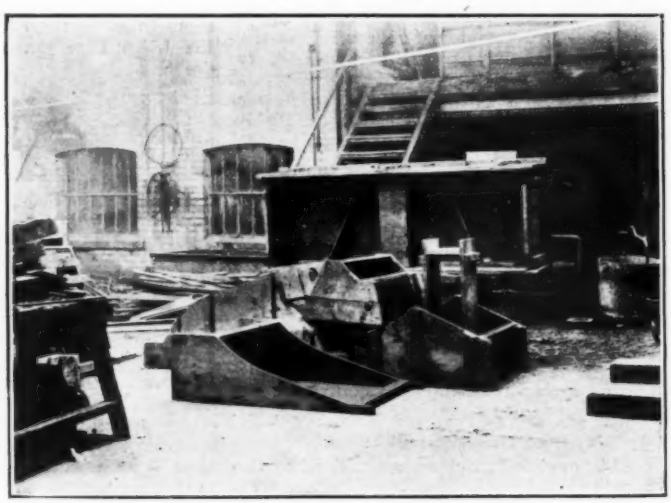

Fig. 4.—The Core Boxes Used.

* A Paper read before the Wales and Monmouthshire Branch of the Institute of British Foundrymen, Mr. W. S. Kinsman presiding.

Building a Mould in Sections for a Machine Base.

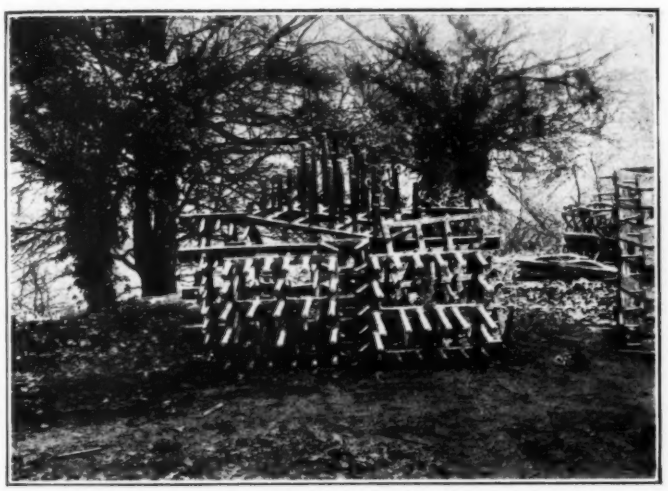

Fig. 5.—The Core Grids.

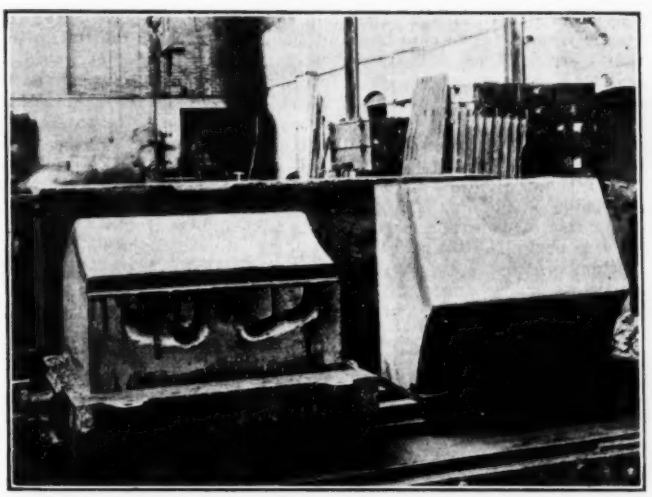

Fig. 6.—The End Cores.

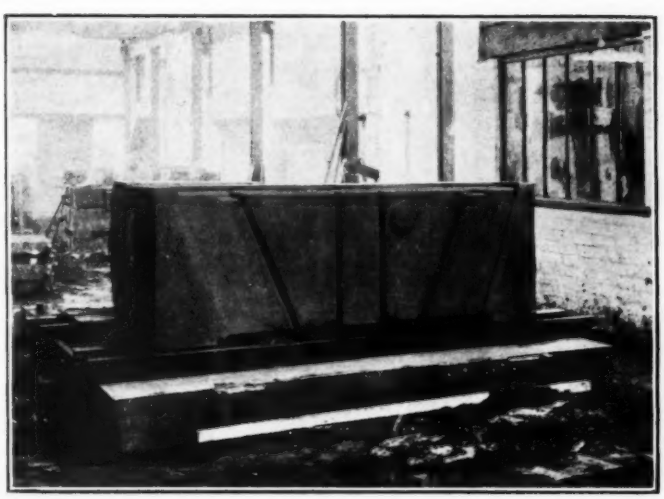

Fig. 7.—One of the Side Cores.

Fig. 8.—The Two Lightening Cores.

Fig. 9.—Main Core in Position.

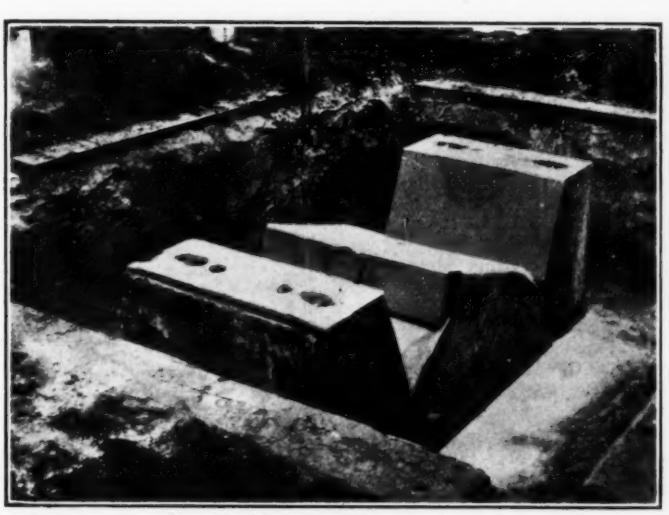

Fig. 10.—Two End Cores are shown in Position.

a coke bed and brought off from thence through a pipe to above the normal floor level. This main core was considered the most important part of the job. It was essential for it to be properly vented and perfectly dry, as it was entirely covered with metal. The main core was also made from a frame core box and the circular parts strickled off. As shown in Fig. 10, the two end cores were next fixed, using thickness strips at each end, and lined up sideways with a straight-edge. These cores were also made from a frame core box and the circular parts strickled off also.

Fig. 11 shows the side core in position, the chains being used for lifting purposes only. This core was made with the ribs in the bottom of the core box. The facing sand was placed in the bottom of box and then the grid inserted. A few lifters or irons were placed where necessary. The grid was strong enough to carry the core to the drying stove without any springing. All the cores were made from good loam sand as facing, and were dried. In Fig. 12 the two side cores are seen in position and bolted together. The end cores were scraped back to the grid and wedged with iron wedges.

The next step was to ram up the outside of the cores. Of course, the original hole in the floor was necessarily larger than the job, to permit a walking trench all round. This was filled in and rammed, but did not require to be packed so tightly as the cores had been bolted securely together. Having filled in hole to the top of the cores, the last two lightening cores were put into position. These were placed on soft clay on which to rest them. This was found to be much better than chaplets or packing, as when the top box was lowered the clay gave and was, consequently, less likely to damage any of the other parts. The top box being lowered on and staked, the lightening cores were bolted to the top box, which was hoisted off with the crane and the clay removed. The mould was then finally closed and bolted down. With the runner box made up, everything was then ready for casting.

The author wishes to acknowledge his indebtedness to Mr. A. Hares, to the directors of Messrs. T. H. & J. Daniels, Limited, of Lightpill Ironworks, Stroud, and to Mr. J. H. Daniels, a director of the firm, for his kindness and help in preparing the photographs and slides of this Paper.

Discussion.

Mr. A. Hares asked how long it took to assemble the cores for the base casting and get ready for pouring the metal and was informed that it took two men just over half a day.

Mr. J. J. McClelland asked whether it would not have been more in keeping with foundry practice to have used drawbacks for the sides and ends and so dispense with the middle and bottom boxes.

Mr. Bennett said it would have been possible to use drawbacks, but there would have been greater difficulties in ramming the deep pockets of sand. It would have necessitated something like a complete pattern and would have taken longer to make the mould.

Replying to a question as to whether the casting could not have been made on its side, Mr. Bennett said that would have been more troublesome still. The top and bottom cores shown would have had to have long prints to balance them, and even then there would have been a dangerous lifting strain on the part of the cores projecting into the metal.

Mr. I. Rees asked how long it took to make the complete job, and was informed it took two men a week to make all the cores, prepare the pit and assemble and get ready for casting. The complete mould weighed about 7 tons and the casting itself 38 cwts.

The meeting concluded with a vote of thanks to Mr. Bennett, proposed by Mr. Ivor Rees and seconded by Mr. McClelland.

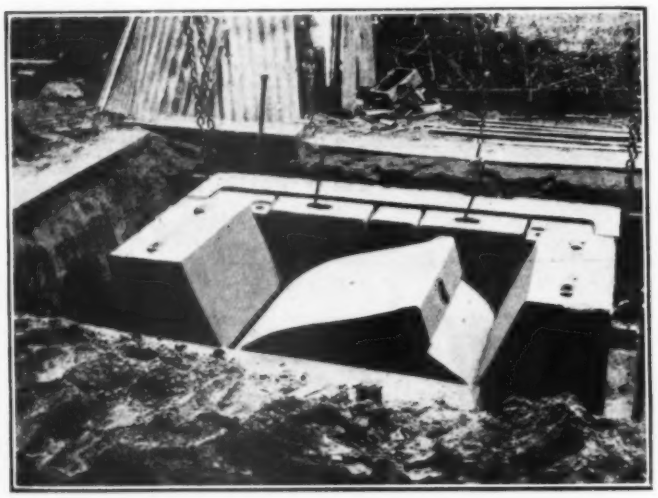

Fig. 11.—Side Cores have now been Set.

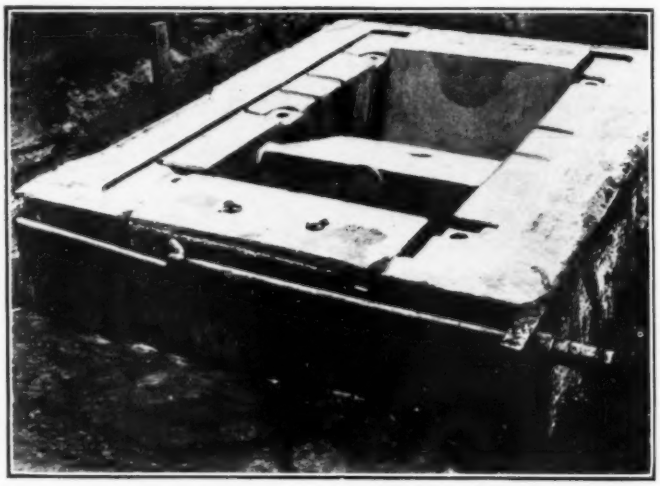

Fig. 12.—Mould Ready for Closing.

The Foundry is a Machine.

(*Continued from page* 328.)

finished sand from the aerator on the mixer. Fig. 9 illustrates the discharge of the sand from the hopper, shown in the previous illustration, into the bucket of the bucket loader feeding the Simpson mixer of this plant. The easy regulation of the sand will be noted.

Fig. 10 is a close-up view of the Simpson mixer in this particular plant. The view shows the mixed sand being discharged from the August aerator into the sand. Fig. 11 shows a typical, large capacity facing-sand plant for use where very large outputs are required. The bucket loader feeds the mixer with the raw ingredients which, after being mixed, are aerated before passing into the bucket elevator, which feeds the large storage hopper. On the right of the view will be seen the jubilee trucks which are used for transporting the mixed sand to various parts of the foundry.

The directors of the Steel Company of Canada, Limited, state that excellent business conditions ruled during 1929 until the closing months of the year. Iron and steel prices were generally steady, with a slight upward tendency affecting a few lines. The output of steel established a record, because of the operations of the new open-hearth furnaces during the latter half of the year.

Convention Papers.

The following is a complete list of the Papers to be presented at the 27th Annual Convention of the Institute of British Foundrymen to be held at Middlesbrough from June 17 to 20, 1930. Full particulars of the Conference will be given in an early issue.

1. *American Exchange Paper.*—"Developments in the Use of Briquetted Borings for Cupola Melting," by F. J. Walls, Pontiac, Michigan.

2. "The Economic Utilisation of British Pig-iron Resources," by C. H. Ridsdale, F.I.C., F.C.S., and N. D. Ridsdale, F.C.S. (Member).

3. "The Founding of Bronze Gear Blanks," by F. W. Rowe, B.Sc. (Associate Member).

4. *French Exchange Paper.*—"The Making of Iron Castings for Heating Apparatus, Stoves and for General Building Purposes," by H. P. Magdelenat, vice-president, Association Technique de Fonderie à Paris.

5. *Belgian Exchange Paper.*—"The Preparation of the Metal for Steel Castings in the Converter," by J. Léonard, Ingénieur A. I. Liége. President of the Association Technique de Fonderie et Belgique. (Hon. Member) Institute of British Foundrymen.

6. "The Future of the Side-Blown Converter in the Steel Foundry," by J. Deschamps (Member).

7. "The Utilisation of Compressed Air in Steel Foundry Practice," by T. W. Barley (Messrs. Edgar, Allen & Company, Limited).

8. "The Production of Large- and Medium-Sized High-Class Iron Castings," by W. Scott.

9. "The Reclamation of Oil-Sand Cores," by Frank Hudson (Member).

10. "The Factor of Personnel, with regard to the future of British Foundry Practice," by Douglas Ingall, D.Sc., F.I.C.Inst.P. (Member), Principal, Constantine Technical College, Middlesbrough.

Financial interests at Fort William, Ontario, are entering into negotiations for the establishment of an electric smelter to treat the local iron ores, and it is possible that construction of the plant may be in progress towards the end of the summer. The process in question was used by the German Government during the war, and is stated to have treated successfully ores with a metallic content as low as 20 per cent. The iron ores of the Thunder Bay district are much higher in metallic content, with an average of about 40 per cent. The inventor of the process is Alexander Estelle, of Hagen, Germany.

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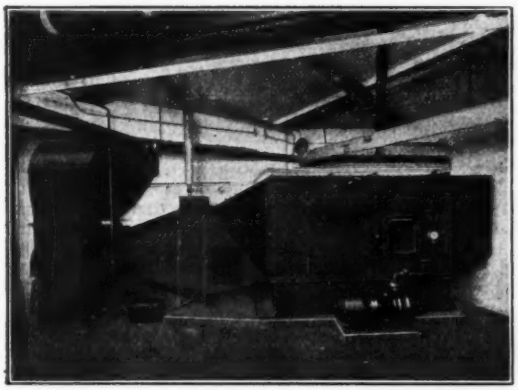

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Trade Talk.

The Association Technique de Fonderie (the French Foundry Technical Association) has removed to 20, rue Richer Paris (9).

An order for 700 tons of structural steel for building construction work in Bristol has been obtained by Messrs. Dorman, Long & Company, Limited.

The Tees-side Bridge & Engineering Works, Limited, Middlesbrough, are to build seven large storage tanks at Avonmouth for the Anglo-Persian Oil Company.

The Cowlairs works of the L. & N.E.R. Company, with the exception of the wagon department, has, from April 26, been put on to short-time working of five days per week.

The North British Locomotive Company, Limited, Springburn, Glasgow, have received an order for three locomotives for the Tharsis Sulphur & Copper Company, Limited.

New kilns for Messrs. F. J. Moore, Limited, limestone-quarry owners and lime manufacturers, Plymouth, are to be built by Priest Furnaces, Limited, of Middlesbrough.

With reference to the Duchess of Bedford's flight to Cape Town with Captain Barnard and Mr. R. Little on the aeroplane "Spider," the following cablegram has been received by the Clyde Alloy Steel Company, Limited, Motherwell, from Captain Barnard :—"Clydall, Motherwell.—Your steel in Bristol engine stood 9,500 miles' flight most satisfactorily.—Barnard." The Clyde Alloy Steel Company, Limited, is a subsidiary of Messrs. David Colville & Sons, Limited, and specialises in the manufacture of high-grade alloy steels and irons.

An agreement has just been renewed between Krupps, of Germany, and Firth-Brearley Stainless Steel Syndicate, of Sheffield, to eliminate competition in stainless steel and goods made from stainless steel. Krupps have agreed, it is reported, not to send stainless steel or its manufactures into Great Britain, and the Sheffield Syndicate have similarly agreed not to send them into Germany. The Syndicate are not the manufacturers, but hold the patents for the making of stainless steel, and it is on behalf of their licences that they have come to the agreement.

Notice is given by the Companies Registration Office that the names of the following companies have been struck off the register, and the companies are dissolved :—A. C. Thompson & Company, Limited; Aluminium Founders, Limited; Aluminium Solder Company, Limited; Blackrod Colliery Company, Limited; Blaenhirwain Anthracite Collieries, Limited; Brinkburn Coal Company, Limited; Chandos Engineering Plant, Limited; Chorley Railway Wagon Company, Limited; Consolidated Brick & Coal Company, Limited; Elliott Peripheral Piston Engine Company, Limited; Hackney Coal Company, Limited; Harriseahead Colliery Company, Limited; Hendy Hematite Iron Ore Company, Limited; Medway Steel Company, Limited; Merthyr Llantwit Colliery Company, Limited; Midland Electrical Tube Company, Limited; Mid-Wales Coal Company, Limited; Nant Dyons Colliery Company, Limited; Newland Engineering Syndicate, Limited; Nowell & Cox Engineering Company, Limited; Parva Engineering Company, Limted; Penrhys Colliery Company, Limited; Premier Foundry Company, Limited; Slag & Minerals, Limited.

The annual report of the British Empire Steel Corporation, Limited, shows an operating profit of $6,046,000, an increase of nearly $2,000,000 on the year 1928. The net profit, including amounts written off for depreciation and the allowance for bond interest, totalled $2,226,000, compared with $855,000 for the preceding year. The total assets at the end of 1929 are shown as $160,000,000, an increase approximately of $4,000,000 on the previous year. With regard to the subsidiary companies, the Dominion Steel Corporation, Limited, showed a net profit of $1,470,000, compared with $787,000 in 1928. The Dominion Iron & Steel Company, Limited, showed an operating profit of $2,247,000, compared with $1,843,000 in 1928. The Dominion Coal Company, Limited, showed a net profit of $200,000, compared with a deficit of $303,000 in the preceding year. Although it is anticipated that operations at the steel plant of the British Empire Steel Corporation during the current year will be somewhat extensive, the management does not look for business as brisk as that experienced in 1929. A number of employees have already been paid off; many of these have been working on the construction of the new blast furnace now nearing completion. Others were in the nail mill. The demand for steel is stated to have fallen off as the result of decreased railway traffic, and the effects on general business of the stock market collapse. Nevertheless, the rail mill, with a large volume of orders to fill, is working at capacity, with a substantial number of men employed.

Personal.

Mr. John Vincent Murray has been awarded the Staffordshire Iron and Steel Institute's research medal and prize for his Paper dealing with the effect of nickel on cast iron.

Mr. T. Lawson, manager of the Hydepark Locomotive Works, Springburn, Glasgow, has been elected President of the Glasgow and West of Scotland Foremen Engineers' Association.

Mr. F. Sanderson, of Messrs. Lawson, Walton & Company, and the popular secretary of the Newcastle Section of the Institute of British Foundrymen, yesterday underwent an operation for abdominal trouble. On behalf of his many friends in the foundry industry, we wish him a speedy recovery.

Mr. Colin Presswood, B.A., F.G.S., manager of the Worksop Works of Messrs. General Refractories, Limited, was married on Easter Tuesday to Miss Winifred Whinnerah, M.A., at Field Broughton, Lancashire. A reception was held in the Parish Rooms, and the honeymoon is being spent in Devon and Cornwall.

Mr. W. H. Smith, managing director of Messrs. Abbots Foundry Company, Limited, Abbotshaugh, Falkirk, has been appointed managing director of the Callandar Iron Company, Limited, Falkirk, in succession to Mr. Robert Kidston, who recently resigned to assume a similar position with Messrs. Bennets Foundry Company, Stockport. Major M. Hay, the chairman of the Callandar Company, will continue to control the business of the company in London.

Mr. Thomas Hoskison has been elected President of the Staffordshire Iron and Steel Institute, in succession to Mr. Percy Jump (Messrs. N. Hingley & Sons, Limited, Netherton), who held the office for two years. Mr. Hoskison is blast-furnace manager at the Earl of Dudley's Round Oak Works. He was educated in Yorkshire, and entered the employment of the Yorkshire Iron & Coal Company, Limited, Ardsley, where he rose to the position of assistant manager and engineer. In 1913 he was appointed assistant manager at the blast furnaces of the Park Gate Iron & Steel Company, Limited, Rotherham, and at the end of 1915 became manager of the blast furnaces of Lloyd's Ironstone Company, Limited, Kettering. He took up his present position in 1920.

Mr. Thomas Hoskison.

Wills.

Gunter, W. A., of Milgate, Roehampton, retired ironmaster	£5,268
Ockenden, W., engineer, of Messrs. John Brown & Company, Limited, Sheffield	£6,060

Reports and Dividends.

G. D. Peters & Company, Limited.—Profit, £8,834; brought in, £12,992; reserve for income-tax, £957; interest, £6,245; carried forward, £14,624.

Sanderson Bros. & Newbould, Limited.—Profit, £10,571; brought in, £10,228; balance of profit and loss account after payment of preference dividend, £9,726, which is carried forward. No ordinary dividend.

Steel Company of Canada, Limited.—Net profit, $3,538,267; dividends on preference shares, $454,741; dividends on ordinary shares, $805,000; benefit plan fund, $200,000; pension fund, $100,000; surplus, $1,978,526.

Hopkinsons, Limited. — Net profit, £78,627; brought in, £19,311; provision for income-tax, £16,000; general reserve, £15,000; final dividend on the ordinary shares of 5 per cent., making 10 per cent.; carried forward, £19,338.

Babcock & Wilcox, Limited.—Net profit, £674,315; brought in, £118,363; to staff pension fund, £8,786; final dividend on the ordinary shares of 8 per cent., tax free, making 15 per cent. for the year; to reserve, £48,000; carried forward, £75,991.

Howard & Bullough, Limited.—Profit, £1,610; brought in, £3,092; transferred from dividend reserve, £55,000; debenture interest, £10,000; interim dividend of 2½ per cent. on the ordinary and preference shares; carried forward, £3,452.

New Companies.

John T. Powell (Blackheath), Limited.—Capital £1,000. Manufacturers of forgings and castings, etc. Permanent directors: J. T Powell, senr., Genlcroft, Beaumont Road, Blackheath, Birmingham; and J. T. Powell, junr.

F. J. Brindley & Sons (Sheffield), Limited, 18, River Lane, Sheffield.—Capital £5,000. Cast-steel hammer and pick manufacturers, etc. Directors: F. A. Brindley (managing director), W. C., F. H., S. J., and C. V. Brindley, and H. Nicholson.

Contracts Open.

Johannesburg, May 30.—400-ton hydraulic wheel press, for the South African Railways and Harbours Administration. The Department of Overseas Trade. (Reference A.X. 9,425.)

Singapore, May 28.—Cast-iron straight spigot and socket pipes, for the Municipality of Singapore. The Department of Overseas Trade. (Reference A.X. 9,457.)

Wormhill, Chapel-en-le-Frith, May 10.—2,600 yds. of cast-iron pipes, etc., for the Chapel-en-le-Frith Rural District Council. Messrs. Brady & Partington, civil engineers, Market Street, Chapel-en-le-Frith. (Fee £3, returnable.)

The Continental Steel Cartel.

It is understood that at the next meeting of the managing committee of the Continental Steel Cartel a proposal will be made to restrict further the production of steel by each of the national groups embodied in the Cartel.

As is known, the prices fixed under the Cartel are those to be charged on an f.o.b. basis, but the c.i.f. prices are practically free. As a result of the recent fall in freights some of the Continental makers or exporters have in certain cases underquoted the official f.o.b. prices by offering to deliver on a c.i.f. basis, thus giving the customers the benefit of the difference in freight as compared with the f.o.b. basis and freight. However, where the convenience of customers is concerned, it is stated that c.i.f. rates are to be continued, although they have not been found to answer in the case of the Scandinavian countries. An effort is now being made to find a formula for c.i.f. quotations which will do justice to all parties concerned.

International Wire Rod Syndicate.

The members of the International Wire Rod Syndicate are to meet on May 8 to consider, among other subjects, the question of remodelling the internal organisation of the combine and a scheme for the formation of a selling office.

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Iron and Steel Markets.

Pig-Iron.

MIDDLESBROUGH.—The resumption of business in markets for Cleveland iron after the holiday break has brought very little improvement in the general position of the industry, it being evident that many of the largest consumers are still delaying purchases, although there can be little hope of price advantage by postponing commitments. It is, however, now recognised that there is a further period of difficulty ahead, and ironmasters will be content if they can maintain the present position as regards price and production. In the Cleveland foundry section no serious apprehensions of a reduction of output need be entertained. Of the iron in stock, a large proportion has already been sold, and market requirements, supplementing a heavy domestic consumption in the steelworks, are sufficient to absorb the limited output. With regard to shipments, it is encouraging to observe that, although exports this month are rather below the March figures, merchants report an improved volume of inquiries from overseas, which they hope will mature. In the meantime prices are firmly maintained, with No. 1 foundry quality at 70s. per ton f.o.t. or f.o.b., No. 3 G.M.B. 67s. 6d., No. 4 foundry 66s. 6d., and No. 4 forge 66s. per ton.

Conditions in the market for East-Coast hematite are extremely unsatisfactory and more discouraging than ever. There seems to be no prospect of a sufficient expansion in the demand to absorb the substantial output of iron, and there would appear to be no alternative to an early reduction of the excessive production. In these circumstances it is difficult to ascertain bed-rock prices, but 74s. per ton is now the quotation for mixed numbers and 74s. 6d. for No. 1 quality.

On the North-West Coast, Bessemer mixed numbers are quoted nominally at 76s. per ton at works.

LANCASHIRE.—Contrary to general expectation, last week's meeting of the Midland ironmasters decided that no alteration in prices would be made, and subsequently business has been on a restricted scale. Unsatisfactory as trade conditions admittedly are in Lancashire, however, there seems to be little doubt that stocks of iron are in need of replenishment. Derbyshire and Staffordshire No. 3 qualities are still quoted at 77s. and Scottish at around 95s., all per ton delivered local stations.

THE MIDLANDS.—Consumers of foundry pig in this area are also disappointed that no reduction of prices has been conceded by the Midlands furnace interests, and business has been, therefore, in limited volume. Prices remain as previously quoted, with Northants No. 3 at 75s. and North Staffordshire and Derbyshire No. 3 at 78s., all per ton delivered local stations.

SCOTLAND.—Conditions in the market for Scotch foundry pig have disclosed little change of late, consumers as a rule buying with extreme caution. There is only a very poor demand, but, nevertheless, the Scotch makers maintain their prices on the basis of 78s. per ton for No. 3 foundry at the furnaces, with a minimum of 2s. 6d. per ton extra for No. 1.

Finished Iron.

At Birmingham this section of the trade continues quiet, and little new business is being obtained. There have been no changes in values. Marked bars remain at £12 10s. at works. The works making this grade of iron are supported fairly well, and business is coming through at a somewhat satisfactory rate. There is, however, no improvement at all in the call for crown and the cheaper grades of iron. Quotations for the former vary from £10 to £10 7s. 6d. and nut and bolt iron from £9 to £9 7s. 6d., delivered the Birmingham district.

Steel.

At Sheffield this week business was again on a moderate scale, but with the holiday out of the way, and the Budget proposals known, there seems a fair prospect of an early return of activity. Many manufacturers, however, report a sharp falling-off of orders of any weight, although there is a very fair total of small items. Production of open-hearth steel exceeds the demand, but it has not so far been necessary to restrict the output. The call for stainless steel is heavy, and competition from Germany and Sweden has had little effect so far. The demand for acid billets is easily met, while good business in soft basic billets continues. Prices:—Siemens acid billets, £9 10s.; basic billets, soft, £6 10s.; medium, £7 12s. 6d. to £8 2s. 6d.; hard, £9 2s. 6d. to £9 12s. 6d.; acid wire rods, £12 5s. to £12 10s.; basic wire rods, soft, £8; medium hard, £9 15s. to £10; hard, £10 10s. to £11; steel hoops, £9 10s. to £10 5s. In the tinplate markets prices rule steady, with coke qualities quoted at 18s. 4½d. to 18s. 7½d., net cash, f.o.b. Welsh ports.

Scrap.

The depression recently reported in markets for foundry scrap material is, so far, unabated, and at Middlesbrough it is difficult for merchants to dispose of accumulated stocks. The local foundries are very small buyers of ordinary heavy cast iron at 59s. 6d. and good machinery quality in handy sizes is offered at round about 62s. 6d. per ton. In Yorkshire there is only a moderate demand for heavy cast-iron scrap at 60s. for ordinary and 63s. for machinery quality, both delivered. There is a minimum of business passing in other classes of scrap material, and prices are unaltered. In Scotland there is practically no demand for heavy machinery cast iron at around 68s. 6d., with heavy ordinary cast iron at 63s. to 64s. Railway chairs are at 66s. 6d., with old cast-iron firebars 56s. 6d. The above prices are all per ton delivered f.o.t. consumers' works.

Metals.

Copper.—Recent price movements in the market for warrant copper will have special significance for an important section of the foundry industry, the heavy fall in values bringing relief to the costs of production in all branches where brass is a basic material. The copper producers did not bring down the price out of sympathy for the difficulties of consumers, or in agreement with the argument that 18-cent copper was checking consumption, but it is probable that the movement resulted from a dissension of opinion among themselves, which might eventually have threatened to break up the combine.

Closing quotations :—

Cash.—Thursday, £54 to £54 2s. 6d.; Friday, £52 7s. 6d. to £52 10s.; Monday, £52 10s. to £52 15s.; Tuesday, £52 to £52 2s. 6d.; Wednesday, £50 7s. 6d. to £50 10s.

Three Months.—Thursday, £53 12s. 6d. to £53 15s.; Friday, £52 to £52 2s. 6d.; Monday, £52 5s. to £52 10s.; Tuesday, £51 15s. to £51 16s. 3d.; Wednesday, £49 15s. to £49 17s. 6d.

Tin.—Irregular price movements have prevailed in the market for standard tin during the past week, combined with weakening of quotations, and an absence of sales of normal dimensions. The result of the meeting of the Tin Producers' Association must eventually have an effect upon the statistical position, and the total visible supplies should show a steady diminution month by month. It will be some time, however, before the full effect of the restriction is felt by the market, and meanwhile conditions are likely to remain unsettled.

Official closing prices :—

Cash.—Thursday, £160 10s. to £160 15s.; Friday, £159 2s. 6d. to £159 5s.; Monday, £157 2s. 6d. to £157 5s.; Tuesday, £156 10s. to £156 12s. 6d.; Wednesday, £153 to £153 5s.

Three Months.—Thursday, £162 12s. 6d. to £162 17s. 6d.; Friday, £161 5s. to £161 7s. 6d.; Monday, £159 7s. 6d. to £159 10s.; Tuesday, £158 15s. to £158 17s. 6d.; Wednesday, £155 to £155 2s. 6d.

Spelter.—Quotations for this metal have fallen steadily during the past week. The failure of the producers to reduce their output below current needs is the primary cause of this depression. The demand from consumers is quite inadequate to absorb the stocks now accumulating. The general position remains unsatisfactory.

Daily quotations :—

Ordinary. — Thursday, £17 5s.; Friday, £17 6s. 3d.; Monday, £17 2s. 6d.; Tuesday, £17; Wednesday, £16 17s. 6d.

Lead.—The ultimate advantage which will accrue to lead consumers by the fall in copper prices cannot yet be determined, but as both metals are largely utilised in the electrical industry it is anticipated that an increased demand may shortly follow the present stagnation in this section of the markets.

The week's prices have been :—

Soft Foreign (Prompt).—Thursday, £18; Friday, £18; Monday, £17 18s. 9d.; Tuesday, £17 15s.; Wednesday, £17 15s.

Patent Specifications Accepted.

The following list of Patent Specifications accepted has been taken from the "Illustrated Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each. The last numbers given are those under which the Specifications will be printed and abridged, and all subsequent proceedings will be taken.

37,057. Stern, P., and Mannesmann-Rohrenwerke. Reinforcing structures for blast-furnace casings. 326,513.

37,593. Garner, J. R., and Royston, J. H. Annealing furnaces. 326,562.

285. Carbonisation Soc. Générale d'Exploitation des Carbones. Apparatus for transforming pig-iron into desulphurised and dephosphorised steel, or into pure iron. 303,891.

1,396. Leonard, N. Castings of large dimensions, especially frames for railway rolling-stock. 316,997.

5,121. Trent Process Corporation. Producing metals from their oxide ores. 306,949.

6,557. Mene, P. Electric annealing furnaces. 306,969.

12,833. Robinson, P. Apparatus for rolling metals. 326,696.

13,711. Sutterlin, G. Return-tube steam boilers. 310,896.

17,659. Babcock & Wilcox Tube Company. Methods of and apparatus for making seamless tubes. 314,523.

28,104. British Thomson-Houston Company, Limited. Magnetic alloys and methods of making them. 314,971.

35,855. Minerals Separation, Limited. Froth-flotation concentration of ores. 301,832.

36,271. Leeds De-Tinning, Limited, and Calvert, A. W. Furnaces for de-tinning metal plates, etc. 326,237.

1,460. Deutsche Gold- und Silberscheideanstalt Vorm. Roessler. Cementing and hardening iron, iron alloys, and steel. 304,209.

11,201. Huntley, Boorne & Stevens, Limited, and Brown, W. L. Presses for stamping sheet metal, etc. 326,380.

14,897. Fantz, F. C. Means for securing tube bends to the ends of tubes. 326,406.

16,376. Folliett, A., and Sainderichin, N. Process of treating ores. 312,667.

37,514. Soc. D'Electrochimie, D'Electrometallurgie et des Acieries Electriques D'Ugine. Manufacture of aluminium-silicon alloys. 302,692.

37,525. I. G. Farbenindustrie Akt.-Ges., and Mond, A. L. Method of casting magnesium or magnesium alloys. 326,820.

37,682. Vanadium Corporation of America. Manufacture of vanadium-aluminium-silicon alloys. 305,202.

Company Meeting.

Scottish Iron & Steel Company, Limited.—The annual meeting of the Scottish Iron & Steel Company, Limited, was held in Glasgow recently. Mr. William Downs (chairman), who presided, said that trade during 1929 was not good, and consequently their output, in common with most others, was not what they could have desired, but they were now beginning to get some benefit from money spent during the past few years towards the better equipment and higher efficiency of the plant. He referred to the proposed scheme for the simplification of the capital structure of the company, and said that, briefly, particulars of the scheme were :—(1) To increase the capital of the company to £780,000 by creating 30,000 ordinary shares of £1 each; (2) to allot to preference shareholders, free of payment and in full satisfaction of their participation rights, one new ordinary share in respect of each 10 preference shares held; and (3) to immediately increase the amount of the special reserve fund to £50,000. It was for the mutual benefit of both classes of shareholders and the company as a whole.

Sterling

UP-TO-DATE MOULDING BOX EQUIPMENT.

STERLING ROLLED STEEL MOULDING BOXES

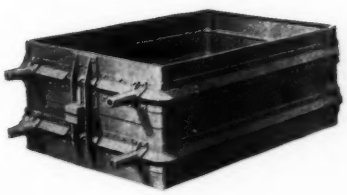
have been designed for THE MODERN FOUNDRY.

They are light and easy to handle.

Cannot crack or break.

Cannot spring.

Strong, Rigid, Durable and Permanently accurate.



BY ADOPTING STERLING BOXES IN YOUR FOUNDRY,

You will halve your moulding costs. You will increase production per man per hour, and reduce your box maintenance costs. You will turn out more accurate castings and thereby reduce your scrap and reject accounts. You will considerably reduce your fettling costs and put money into your pocket that is now running to waste.

STERLING BOXES save their cost in a few months and are obviously a sound investment for any foundry.

STERLING FOUNDRY SPECIALTIES Ltd.

Agents at:—London, Manchester, Newcastle and Glasgow.

BEDFORD.

WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	50	7	6
Three months	49	15	0
Electrolytic	62	0	0
Tough	59	10	0
Best selected	60	0	0
Sheets	92	0	0
India	77	0	0
Wire bars	64	10	0
Do. May	64	10	0
Do. June	64	10	0
Ingot bars	64	10	0
H.C. wire rods	66	15	0
Off. av. cash, March	69	5	10⅝
Do., 3 mths., March	67	13	2 13/16
Do., Sttlmnt., March	69	5	11⅜
Do., Electro, March	83	16	6⅞
Do., B.S., March	76	11	3
Do., wire bars, March	84	5	0
Aver. spot price, copper, Mar.	69	5	10⅝
Solid drawn tubes			13d.
Brazed tubes			13d.
Wire			9d.

BRASS.

Solid drawn tubes	11½d.
Brazed tubes	13½d.
Rods, drawn	10½d.
Rods, extd. or rlld.	7d.
Sheets to 10 w.g.	9½d.
Wire	9½d.
Rolled metal	9½d.
Yellow metal rods	7d.
Do. 4 × 4 Squares	7½d.
Do. 4 × 3 Sheets	8d.

TIN.

	£	s.	d.
Standard cash	153	0	0
Three months	155	0	0
English	154	0	0
Bars	159	10	0
Straits	158	12	6
Australian	157	15	0
Eastern	160	15	0
Banca	163	10	0
Off. av. cash, March	164	19	0⅝
Do., 3 mths, March	167	0	2⅝
Do., Sttlmt., March	164	19	2
Aver. spot, March	164	19	0⅞

SPELTER.

	£	s.	d.
Ordinary	16	17	6
Remelted	15	17	6
Hard	14	5	0
Electro 99.9	19	5	0
English	17	7	6
India	15	5	0
Zinc dust	23	0	0
Zinc ashes	4	10	0
Off. aver., March	18	11	1½
Aver., spot, March	18	6	0⅞

LEAD.

	£	s.	d.
Soft foreign ppt.	17	15	0
English	19	5	0
Off. average, March	18	17	5 9/16
Average spot, March	18	16	1⅞

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	27	10	0
Do. V.M. ex-whf.	26	10	0
Rods	30	0	0
Boiler plates	24	10	0
Battery plates	25	0	0

ANTIMONY.

	£	s.	d.
Special brands, Eng.	40	0	0
Chinese	29	0	0
Crude	20	0	0

QUICKSILVER.

	£	s.	d.
Quicksilver	22	15	0

FERRO-ALLOYS AND STEEL-MAKING METALS.

	£	s.	d.
Ferro-silicon—			
25%	7	15	0
45/50%	11	10	0
75%	18	17	6
Ferro-vanadium—			
35/50%	12/9 lb. Va.		
Ferro-molybdenum—			
70/75% c. free	4/2 lb. Mo.		
Ferro-titanium—			
23/25% carbon-free	9d. lb.		
Ferro-phosphorus, 20/25%	£16	0	0
Ferro-tungsten—			
80/85%	2/10 lb.		
Tungsten metal powder—			
98/99%	3/1 lb.		
Ferro-chrome—			
2/4% car.	£30	10	0
4/6% car.	£23	15	0
6/8% car.	£22	10	0
8/10% car.	£22	0	0
Ferro-chrome—			
Max. 2% car.	£33	15	0
Max. 1% car.	£38	0	0
Max. 0.70% car.	£39	15	0
70% carbon-free	11d. lb.		
Nickel—99% cubes, or pellets	£175	0	0
Ferro-cobalt	9/6 lb.		
Aluminium 98/99%	£95	0	0
Metallic chromium—			
96/98%	2/7 lb.		
Ferro-manganese (net)—			
76/80% loose	£11	15	0
76/80% packed	£12	15	0
76/80% export	£11	10	0
Metallic manganese—			
94/96% carbonless	1/4 lb.		

Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	£0 2 2
Finished bars, 18% tungsten	£0 3 0

Per lb. net, d/d buyers' works.

Extras—

Rounds and squares, 3 in. and over	4d. lb.
Rounds and squares, under ½ in. to ¼ in.	3d. lb.
Do., under ¼ in. to 7/16 in.	1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅜ in.	3d. lb.
Do., under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.

Bars cut to length, 10% extra.

SCRAP.

	£	s.	d.	£	s.	d.
South Wales—						
Heavy steel	3	2	6	to 3	3	6
Bundled steel and shrngs.	2	17	6	to 3	1	6
Mixed iron and steel	2	17	6	to 2	19	0
Heavy cast iron	2	18	0	to 2	19	0
Good machinery for foundries			3	0	0	
Cleveland—						
Heavy steel			2	17	6	
Steel turnings			2	11	0	
Cast-iron borings			2	8	0	
Heavy forge			3	12	6	
W.I. piling scrap			3	8	0	
Cast-iron scrap	2	19	6	to 3	2	6
Midlands—						
Ord. cast-iron scrap			3	3	6	
Heavy wrought			3	12	6	
Steel turnings			1	17	6	
Scotland—						
Heavy steel			3	0	6	
Cast-iron borings			2	10	0	
Wrought-iron piling			3	18	6	
Heavy machinery			3	8	6	

London—Merchants' buying prices delivered yard.

	£	s.	d.
Copper (clean)	50	0	0
Brass	36	0	0
Lead (less usual draft)	16	0	0
Tea lead	12	0	0
Zinc	10	0	0
New aluminium cuttings	64	0	0
Braziery copper	47	0	0
Gunmetal	48	0	0
Hollow pewter	120	0	0
Shaped black pewter	87	0	0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—	
Foundry No. 1	70/-
Foundry No. 3	67/6
Foundry No. 4	66/6
Forge No. 4	66/-
Hematite No. 1	74/6
Hematite M/Nos.	74/-
N.W. Coast—	
Hem. M/Nos. d/d Glas.	85/6
„ d/d Birm.	94/6
Midlands—	
Staffs. common*	—
„ No. 4 forge*	73/6
„ No. 3 fdry.*	78/6
Shrops. basic	—
„ Cold blast, ord.	—
„ „ roll iron	—
Northants forge*	70/-
„ fdry. No. 3*	75/-
Derbyshire forge*	73/6
„ fdry. No. 3*	78/6
„ basic*	—
*d/d Black Country dist.	
Scotland—	
Foundry No. 1	80/6
„ No. 3	78/-
Hem. M/Nos.	81/-
Sheffield (d/d district)—	
Derby forge	67/6
„ fdry. No. 3	72/6
Lincs. forge.	70/-
„ fdry No. 3	75/-
E.C. hematite	89/-
W.C. hematite	90/-
Lincs. (at furnaces)—	
Forge No. 4	—
Foundry No. 3	—
Basic	—
Lancashire (d/d eq. Man.)—	
Derby forge	72/-
„ fdry. No. 3	77/-
Staffs foundry No. 3	77/-
Dalzell, No. 3 (special)	105/- to 107/6
Summerlee, No. 3	95/-
Glengarnock, No. 3	—
Gartsherrie, No. 3	95/-
Monkland, No. 3	95/-
Shotts, No. 3	95/-

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

	£	s.	d.	£	s.	d.
Iron—						
Bars (cr.)				10	15	0
Nut and bolt iron	9	0	0	to 9	7	6
Hoops				10	15	0
Marked bars (Staffs) f.o.t.				12	10	0
Gas strip				10	15	0
Bolts and nuts, ¾ in. × 4 in.				15	5	0
Steel—						
Ship plates	8	15	0	to 8	17	6
Boiler plts.	9	17	6	to 10	10	0
Chequer plts.				10	12	6
Angles				8	7	6
Tees				9	7	6
Joists				8	10	0
Rounds and squares, 3 in. to 5½ in.				9	7	6
Rounds under 3 in. to ¼ in. (Untested)				8	2	6
				and upwards		
Flats—8 in. wide and over				8	12	6
„ under 8 in. and over 5 in.				8	17	6
Rails, heavy				8	10	0
Fishplates				12	0	0
Hoops (Staffs)	9	5	0	to 9	15	0
Black sheets, 24g.				9	15	0
Galv.cor.shts., 24g.	11	17	6	to 12	0	0
Galv. fencing wire, 8g. plain				12	0	0
Billets, soft	6	0	0	to 6	10	0
Billets, hard	7	10	0	to 8	0	0
Sheet bars	5	15	0	to 6	5	0
Tin bars	5	15	0	to 6	5	0

PHOSPHOR BRONZE.

	Per lb. basis.
Strip	1/2
Sheet to 10 w.g.	1/2½
Wire	1/3½
Rods	1/3
Tubes	1/7½
Castings	1/2

Delivery 3 cwt. free.
10% phos. cop. £40 above B.S.
15% phos. cop. £50 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. CLIFFORD & SON, LIMITED.

NICKEL SILVER, &c.

	per lb.
Ingots for raising	9d. to 1/3
Rolled—	
To 9 in. wide	1/3 to 1/9
To 12 in. wide	1/3½ to 1/9½
To 15 in. wide	1/3½ to 1/9½
To 18 in. wide	1/4 to 1/10
To 21 in. wide	1/4½ to 1/10½
To 25 in. wide	1/5 to 1/11
Ingots for spoons and forks	9d. to 1/5½
Ingots rolled to spoon size	1/- to 1/8½
Wire round—	
3/0 to 10 G.	1/6½ to 2/1½

with extras according to gauge.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	20.26
No. 2 foundry, Valley	18.50
No. 2 foundry, Birm.	14.00
Basic	20.26
Bessemer	20.76
Malleable	20.76
Grey forge	19.76
Ferro-mang. 80%	94.00
O.-h. rails, h'y, at mill	43.00
Billets	33.00
Sheet bars	33.00
Wire rods	38.00
	Cents.
Iron bars, Phila.	2.12
Steel bars	1.80
Tank plates	1.80
Beams, etc.	1.80
Skelp, grooved steel	1.85
Skelp, sheared steel	1.85
Steel hoops	2.20
Sheets, black, No. 24	2.55
Sheets, galv., No. 24	3.30
Sheets, blue an'l'd, No. 13	2.25
Wire nails	2.15
Plain wire	2.40
Barbed wire, galv.	2.95
Tinplates, 100-lb. box	$5.25

COKE (at ovens).

Welsh foundry	27/6
„ furnace	17/6 to 22/6
Durham and Northumberland—	
„ foundry	15/6
„ furnace	15/6
Midlands, foundry	—
„ furnace	—

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 box	18/4½
„	28×20 „	36/9
„	20×10 „	26/4½
„	18¾×14 „	19/1½
C.W.	20×14 „	16/6
„	28×20 „	33/9
„	20×10 „	23/6
„	18¾×14 „	17/-
Terneplates	28×20	32/6 per box basis f.o.b.

SWEDISH CHARCOAL IRON & STEEL.

Pig-Iron	£6	0	0	to	£7	10	0
Bars, hammered, basis	£17	10	0	to	£18	10	0
Bars and nail-rods, rolled, basis	£15	17	6	to	£16	15	0
Blooms	£10	0	0	to	£12	0	0
Keg steel	£32	0	0	to	£33	0	0
Faggot steel	£20	0	0	to	£24	0	0
Bars and rods dead soft, steel	£11	0	0	to	£14	0	0

All per English ton, f.o.b. Gothenburg.

TUBES AND FITTINGS.

Over ½ in. up to 6 in.

	Tubes.	Fittings.
Gas	62½%	47½%
Water	58¾%	42½%
Steam	55%	37½%

W.I. 12½% extra.

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.		
April	24	54	0	0	dec.	5/-
,,	25	52	7	6	,,	32/6
,,	28	52	10	0	inc.	2/6
,,	29	52	0	0	dec.	10/-
,,	30	50	7	6	,,	32/6

Electrolytic Copper.

		£	s.	d.		
April	24	64	0	0	No change	
,,	25	64	0	0	,,	,,
,,	28	62	0	0	dec.	40/-
,,	29	62	0	0	No change	
,,	30	62	0	0	,,	,,

Standard Tin (cash).

		£	s.	d.		
April	24	160	10	0	dec.	2/6
,,	25	159	2	6	,,	17/6
,,	28	157	2	6	,,	40/-
,,	29	156	10	0	,,	12/6
,,	30	153	0	0	,,	70/-

Tin (English ingots).

		£	s.	d.		
April	24	161	15	0	No change	
,,	25	160	5	0	dec.	30/-
,,	28	158	5	0	,,	40/-
,,	29	157	10	0	,,	15/-
,,	30	154	0	0	,,	70/-

Zinc Sheets (English).

		£	s.	d.		
April	24	28	0	0	No change	
,,	25	27	10	0	dec.	10/-
,,	28	27	10	0	No change	
,,	29	27	10	0	,,	,,
,,	30	27	10	0	,,	,,

Spelter (ordinary).

		£	s.	d.		
April	24	17	5	0	dec.	1/3
,,	25	17	6	3	inc.	1/3
,,	28	17	2	6	dec.	3/9
,,	29	17	0	0	,,	2/6
,,	30	16	17	6	,,	2/6

Lead (English).

		£	s.	d.		
April	24	19	10	0	dec.	5/
,,	25	19	10	0	No change	
,,	28	19	10	0	,,	,,
,,	29	19	5	0	dec.	5/-
,,	30	19	5	0	No change	

AVERAGE MONTHLY PRICES OF CLEVELAND No. 3 PIG-IRON.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly average.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1887	37 5	35 10	34 4	34 4	34 1	34 10	34 4	34 5	33 9	31 10	31 8	33 6	34 2
1888	32 2	31 1	31 5	31 9	30 11	31 5	32 4	33 5	34 8	34 2	33 11	33 10	32 7
1889	35 8	35 0	37 5	38 9	38 6	37 10	40 1	43 4	44 1	51 5	64 7	61 1	43 10
1890	60 3	53 1	51 0	47 4	42 2	41 5	43 2	45 7	47 9	47 10	47 4	43 1	47 6
1891	42 1	41 10	39 9	38 7	40 9	41 0	40 8	39 8	40 4	39 11	38 8	38 1	40 1
1892	37 7	35 7	36 10	37 10	39 2	40 11	39 11	39 10	40 0	38 6	37 6	37 4	38 5
1893	36 0	34 3	34 4	34 2	33 10	34 8	35 3	35 5	35 4	34 8	34 7	35 9	34 10
1894	35 8	35 11	36 1	36 1	35 5	35 5	35 5	35 11	36 6	35 8	35 8	35 1	35 9
1895	34 7	34 4	34 4	34 8	35 6	35 2	36 1	37 1	38 10	38 6	37 11	37 6	36 3
1896	37 3	38 4	38 7	38 1	37 4	37 4	36 11	36 11	37 11	39 2	40 5	40 5	38 3
1897	41 2	40 4	40 5	39 2	39 7	40 9	39 6	40 5	41 7	42 5	41 5	40 4	40 7
1898	40 9	40 8	40 6	40 0	40 7	39 11	40 4	41 11	43 0	44 11	49 1	44 3	42 0
1899	46 10	47 11	47 9	49 10	55 11	62 10	71 6	65 9	67 7	68 8	70 0	66 9	60 5
1900	67 10	68 10	73 10	76 2	74 2	68 6	69 3	71 4	70 9	67 8	63 6	53 6	68 9
1901	48 0	46 6	45 8	45 5	45 10	44 7	44 6	45 3	45 3	45 3	43 6	43 1	45 3
1902	43 11	46 7	46 9	47 11	48 10	49 7	50 9	52 1	53 6	52 9	50 9	47 11	49 3
1903	47 3	48 9	51 10	49 0	46 1	46 2	46 7	46 8	45 7	43 6	42 10	41 11	46 4
1904	42 3	42 7	43 3	44 7	44 0	42 10	42 9	43 3	43 1	43 9	46 1	48 7	43 11
1905	48 11	48 0	49 6	50 1	51 5	45 6	45 9	47 5	48 8	52 11	52 9	53 3	49 6
1906	53 9	50 1	48 1	48 8	50 2	50 3	50 6	53 0	54 6	56 8	58 6	62 4	53 6
1907	60 4	56 6	54 10	56 0	61 1	58 1	57 8	57 8	55 7	54 8	50 8	50 0	56 2
1908	48 5	49 3	51 7	51 10	51 6	51 2	50 0	51 4	52 0	49 8	49 4	48 11	50 8
1909	48 10	48 1	46 9	47 9	48 4	48 9	48 6	50 5	51 3	51 11	51 2	50 7	49 4
1910	51 10	51 3½	51 7½	50 10	49 10	49 2	48 10	49 8½	49 3½	49 7½	49 6½	49 10	50 4
1911	49 11½	49 2½	48 5	46 11	46 4	46 6	46 11½	47 4	47 0	46 7	47 4½	48 1	47 7
1912	50 0	49 5½	51 1½	53 7½	54 4	55 1	57 5½	64 6½	61 7½	66 8½	67 8	68 0	58 5½
1913	66 11½	63 8½	64 8	67 1½	66 3	56 9½	56 3½	55 8	55 4	53 0	50 1	50 4	58 10
1914	50 11	51 5½	51 0½	51 4½	51 6	51 6½	51 5	52 3	51 5	50 1	50 3	53 0	51 4½
1915	55 7	56 6	61 0	66 7	65 2	66 10	65 4	66 0½	65 3	65 11	69 10½	75 7½	65 7
1916	80 2	91 6	87 4½	86 10	82 6	82 6	87 6	87 6	87 6	87 6	87 6	87 6	85 10
1917	87 6	87 6	87 6	92 6	92 6	92 6	92 6	92 6	92 6	92 6	92 6	95 0	99 3
1918	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0
1919	95 0	95 0	95 0	95 0	152 6	160 0	160 0	160 0	160 0	160 0	160 0	160 0	137 8
1920	175 0	175 0	187 6	200 0	208 0	217 6	217 6	221 0	225 0	225 0	225 0	225 0	209 3
1921	222 6	195 0	150 0	126 0	120 0	120 0	120 0	136 3	127 0	120 0	110 0	100 0	137 4
1922	92 6	90 0	90 0	90 0	90 0	90 0	89 0	87 3	92 6	92 6	92 6	91 3½	90 7½
1923	94 6	108 9	125 6	129 4½	128 5	136 0	128 1½	121 11	97 1½	97 0	100 0	100 0	110 6½
1924	99 10	97 3½	91 9	93 9	91 9	89 10½	87 9	85 0	82 5½	80 2½	81 9	81 9	88 7½
1925	80 4½	78 10½	78 0	78 3	76 0	73 10½	71 7½	69 10½	68 1½	66 7½	66 0	66 10½	72 10½
1926	69 4½	70 0	70 0	70 0	72 6	75 10½	86 7½	90 0	93 10½	117 10	120 0	99 0	86 3
1927	85 0	83 1½	81 0	80 0	73 9	70 0	70 0	68 9	67 6	67 6	66 10½	65 0	73 2½
1928	65 0	65 0	65 6	66 0	66 0	66 0	66 0	66 0	66 0	66 0	66 0	66 0	65 9½
1929	66 0	66 9	67 0	68 1½	69 5	71 10½	72 9	72 6	72 6	72 6	72 6	72 6	70 4½
1930	72 6	72 6	70 0	67 6	—	—	—	—	—	—	—	—	—

WILLIAM JACKS & COMPANY,

WINCHESTER HOUSE, OLD BROAD ST., LONDON, E.C.2.

18, BENNETTS HILL, BIRMINGHAM.

PIG IRON

REGISTERED TRADE MARK

SCOTCH, MIDDLESBRO', HEMATITE, BASIC, SPECIALS, &c.

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE.

WILLIAM JACKS & COMPANY,

19, ST. VINCENT PLACE, GLASGOW.

ZETLAND ROAD, MIDDLESBROUGH.

SITUATIONS VACANT AND WANTED.

EXPERIENCED Foundry Manager desires similar position abroad; good practical general experience up to 10 tons in green, dry sand and loam; age 34 years; excellent references.—Apply, Box 502, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

MIDDLESBROUGH EDUCATION COMMITTEE.

CONSTANTINE TECHNICAL COLLEGE.

Principal:
DOUGLAS H. INGALL, D.Sc., F.I.C., F.Inst.P.

THE Governing Council invite applications for the following full-time posts:—

LECTURER IN MATHEMATICS.

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Forms of application for the above posts may be obtained on receipt of a stamped addressed foolscap envelope, and applications should reach the undersigned not later than Monday, May 19, 1930.

W. J. WILLIAMS,
Director of Education.

Education Offices, Middlesbrough,
April 29, 1930.

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